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THE BUTTERS CYANIDE PLANT, VIRGINIA CITY, NEV.

A Gold-extraction Mill Equipped with Important Labor-saving Devices

BY CLAUDE T. RICE

This plant is situated in Six Mile cañon, at the foot of Sugar Loaf peak, 2½ miles south of Virginia City, Nevada. The plant was built a few years ago to treat the old accumulated tailings from the pan-amalgamation mills, which were so prominent on the Comstock in bonanza days. These tailings are worth from $3.50 to $4 a ton, carrying about $1.40 in gold and 4 oz. silver, together with 2 to 3 lb. of copper to the ton in the form of sulphate.

At first the plant ran on these tailings, which required no crushing, since 80 per cent. consisted of slimes, and the rest fine sands, the ores having been ground fairly fine in the pan-amalgamation process. Since that time, with the rapid development of the newer Nevada camps, the smelters have been oversupplied with siliceous ores, and smelting charges have been very high. For this reason Mr. Butters has undertaken the treatment of some of these ores in his cyanide plant, crushing them in some Virginia City mills, and cyaniding the tails from the Frue vanners. As a result it is likely that in a few months one will see a custom cyanide plant competing with smelters for the lower grades of southern Nevada ores.

The treatment of Tonopah ores has already been perfected at the Butters plant. At present it is treating about 100 tons per day from Tonopah, mostly oxidized ore, but some sulphides from the Tonopah-Belmont mine. In order to strengthen himself in this field Mr. Butters in the summer of 1906 began the erection of a 20-stamp mill, having 1250-lb. stamps, to crush ores for the cyanide plant. This plant will be equipped with tube-mills for grinding, and there will be also tables, vanners and Wilfley slimers for concentrating the sulphides in the ore, which product will then be shipped to smelters. An aërial tramway will bring the ore from the Virginia & Truckee tracks in Virginia City, to the mill.

REMOVAL OF COPPER

The pan-amalgamated tailings, to treat which the plant was originally designed, contain considerable copper, owing to the large amount of copper sulphate used in the pan-amalgamation process. At first an attempt was made to treat them with an acid bath before cyaniding. Sulphur was burned in acid burners, and the SO_2, led into water in tanks to form sulphurous acid, was forced into the pulped tailings. This, after a short period of agitation, readily dissolved the copper from the tailings, and the decanted copper-bearing solution was taken to Siemens-Halske boxes for electric precipitation of the copper. But electric precipitation proved a failure because the solution became foul by the failure of the slimes to settle after the sulphurous acid treatment, and through no fault of the process.

KINKEAD MILL

BUTTERS CYANIDE MILL, VIRGINIA CITY, NEVADA

Now the tailings are treated directly with cyanide solution, which dissolves the copper along with the gold and silver. The resulting solution is then taken to Siemens-Halske boxes, and the solution regenerated in cyanide through the breaking up of the copper cyanide formed. Often the head solutions, carrying 0.05 per cent. KCN, after going through the Siemens-Halske boxes carry 0.09 per cent. KCN. The product from the electric boxes sometimes carries 52 per cent. copper, and averages about 30 per cent. copper when treating these tailings. The tailings are pulped in cyanide solution, and separated into sands and slimes, the slimes treated by agitation and filtration, and the

BLAISDELL DISTRIBUTER, BUTTERS MILL

sands percolated. Mr. Butters has this supply of tailings to fall back on whenever he gets short of ore.

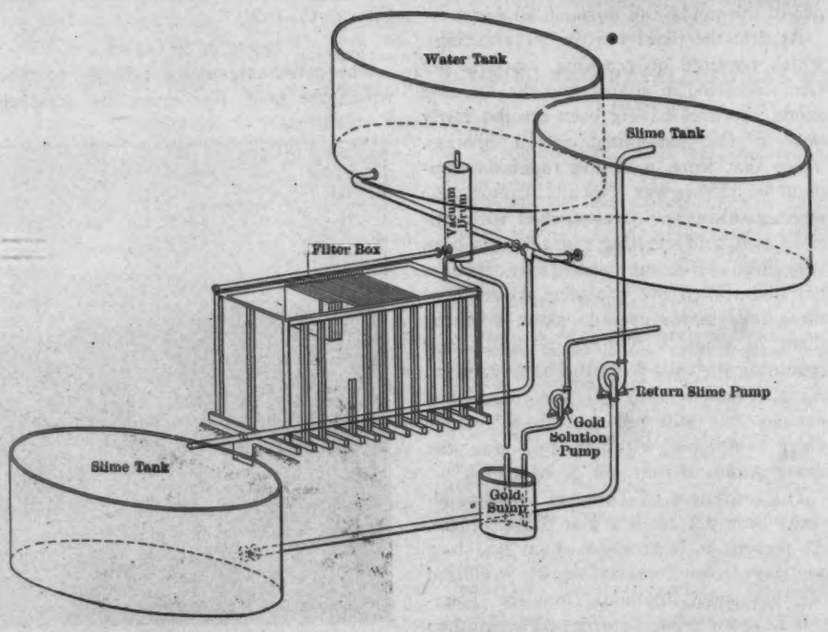
As the plant is running on ores from several of the mines of the Tonopah Mining Company and its allied companies, the ores are variable and the treatment differs from time to time with the ores. The capacity of the mill is from 200 to 220 tons per day, but at present, owing to limited capacity of the mills that do the crushing, only 90 to 100 tons are treated.

CRUSHING

The crushing of the ore is done in two mills in Virginia City, the Best & Belcher, and the Kinkead. Both these plants use Kinkead mills for crushing, and both have side-hill situations.

At the Best & Belcher mill, the ore which has already been crushed in a sampler is passed over a 1¼-in. grizzly. The fines go to 200-ton bins, while the coarse is crushed in a No. 2 Gates crusher. The crushed ore is fed by Kinkead feeders to six Kinkead mills having 30-mesh screens. The pulp is sent to a classifier; thence the slimes go to sluice boxes leading to the Butters mill, while the sands are concentrated upon five 6-ft. vanners. The tailings from the vanners are re-crushed in two Kinkead mills, two others at present being held in reserve. These mills have 40-mesh screens. The re-crushed pulp then goes to a classifier, the sands from which are concentrated upon four 6-ft. Frue vanners. The vanner tailings, joined by the slime from the two classifiers, go through sluice boxes to the Butters plant. This mill crushes about 50 to 55 tons of Tonopah ore per day.

At the Kinkead the ore is crushed in six Kinkead mills using 40-mesh screens, concentrated on six 6-ft. Frue vanners, and the tails are sent through sluice boxes to the Butters plant. This mill treats 35 to 40 tons of Tonopah ore per day. The plant is run by an 18-in. Pelton wheel driven by a ½-in. nozzle and 260-lb. water pressure. It is said to generate about 12 h.p. Recently the Kinkead mill has been greatly improved by making the bottom of the muller more spherical in shape. Formerly die rings had to be put in frequently to take up the play of the muller as it wore on the bottom. The more spherical shape of the bottom obviates this use of liners to a great extent.



ARRANGEMENT OF 100-TON SLIME FILTER

BLAISDELL EXCAVATOR

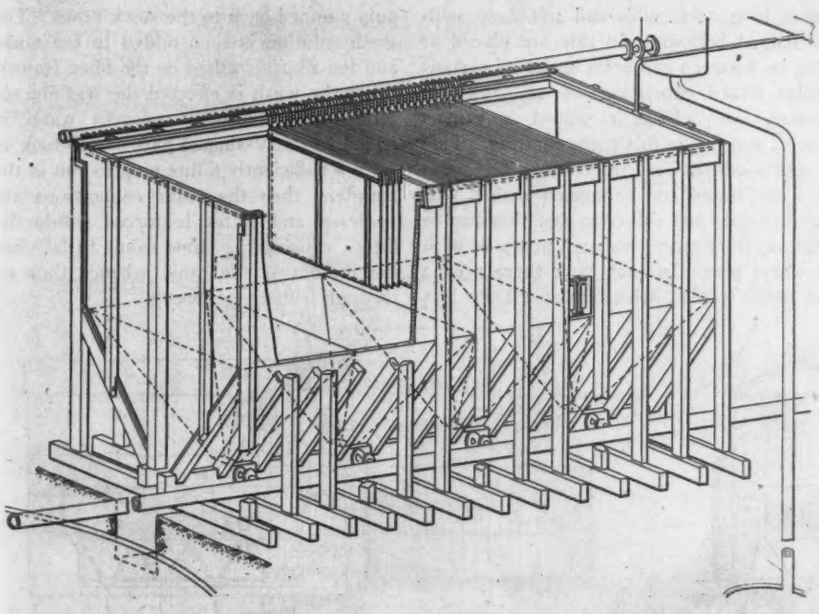
HANDLING OF SANDS

The crushed ore is taken in small sluice boxes to the Butters plant down the cañon, where it enters a 30-ft. sand wheel, which elevates to a launder feeding a Butters distributer, which in turn charges the collecting tanks. These collecting tanks are 30 ft. in diameter and about 5 ft. high, inside dimensions, and are made of wooden staves. The slimes overflow to the slime-collecting tanks, after having passed through a spitzkasten, which removes any sands and returns them to the sand wheel.

When the collecting tanks are filled with sands they are allowed to drain. Then the tanks are emptied by a Blaisdell excavator, which sends the sands through a central hole in the bottom, whence they are elevated to a belt conveyer; this takes them to a Blaisdell distributer, which, by means of revolving disks, scatters them over the tank to be charged. The Blaisdell excavator removes all the sand from a tank except the last few inches, which have to be shoveled through the hole. The bottom layer is removed only once in three or four chargings.

The Blaisdell distributer is equipped with a blade which can be moved so as to regulate the distribution of the charge over the tank area by making more of the sands go to one side or the other of the rotating disk. By means of a Blaisdell distributer all but the central ring under the disk is charged with sands. The excavator is then moved over the tank and it levels the surface, finally filling the central cavity flush with the rest. These collecting tanks hold from 114 to 120 tons of ore. A charge can be transferred from one tank to another in from two to three hours.

DISCHARGE LAUNDER AND SLIME-COLLECTING TANKS, BUTTERS MILL



DETAIL VIEW OF FILTER BOX

There are two of these collecting tanks and six sand-treatment tanks, all of which are on the top level or floor of the mill. The sands are given a double treatment, being transferred first from a collecting tank to a first-treatment tank, then after being leached for some time they are drained and transferred to a second-treatment tank where, before discharging, they are given a wash with a weak, barren solution. Owing to the fact that these ores carry a good deal of silver a long leach is necessary, varying from 12 to 14 days, according to the character and amount of ore received. The strength of cyanide solution used is 0.3 per cent.

HANDLING OF SLIME

The slime overflow from the sand tank, after passing a spitzkasten to remove any fine sands which may have been carried over, is taken to a slime-collecting tank of the same dimensions as the sand tanks. There are six of these collecting tanks and six slime-treatment tanks.

The slime flows into the tank through a launder extending 3 or 4 ft. below the overflow of the tank, thus insuring a quicker settlement of the slimes. This is also promoted by adding lime, not only to effect the settling, but also to neutralize any acid in the ore.

The slimes are allowed to settle, and then the water is decanted off. The pulp is then discharged into one of the six treatment tanks placed on the floor below. The treatment or agitation tanks are equipped with paddle agitators, and are also connected with a Butters slime pump, an improved centrifugal which draws the

AGITATING SLIME TANKS

pulp off at the bottom and delivers it to the top of the tank, thus giving a very effective agitation. Compressed air is fed into the pulp at the pump, which gives a good aëration of the solution.

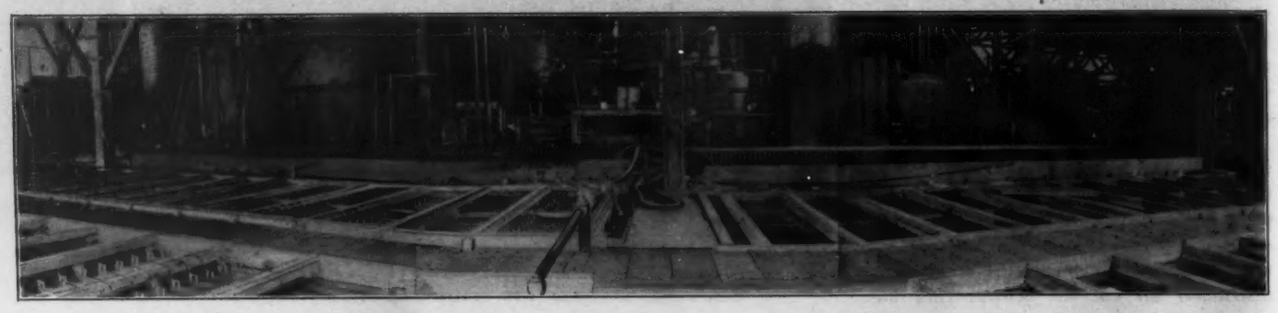
In these treatment tanks cyanide solution is added, the strength being brought up to 0.125 to 0.15 per cent. KCN, according to the ore. In the case of the slimes from the accumulated pan-amalgamation tailings, which are pulped and treated directly, this solution contains only 0.05 per cent. KCN. The cyanide solution is added to the slimes only after the treatment tanks are reached, as otherwise the collecting tanks would become charged with some cyanide and some gold would be lost in the decanted water.

The slimes are agitated from 48 to 60 hours, as required, and as the amount of ore treated allows, and then it is settled. The cyanide solution is then siphoned off and taken to the Siemens-Halske boxes, while the slimes are lowered to one of the four deep tanks on the main floor of the mill. From there they are taken to the Butters filter tanks.

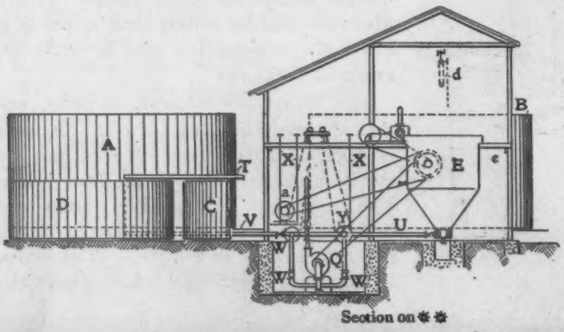
FILTERING

The filter boxes used at the Butters plant are old electric precipitation boxes, 29 ft. long, 10 ft. wide and 4 ft. deep, with V-shaped bottoms. In this are placed at 3⅞ in. between centers a series of rectangular filters consisting of an iron-pipe frame, over which is placed a canvas cover, and inside this cocoa matting. This cover is quilted over the frame. The pipes are perforated and connected with a system of pipes and valves so that they can be joined either with a vacuum pump or with a water pipe. In each tank there are 92 of these frames, which have a little less than 10x5 ft. area. The pulped slimes are pumped into the tank, a vacuum of about 22 to 23 in. of mercury being used during the filtering.

This filtered solution is then taken to the Siemens-Halske boxes. The filtering is continued until a cake ¾ in. thick has been formed on the frames, when the vacuum is lowered to about 6 in. and the excess pulp pumped back to the stock tanks. The wash solution is then added to the tanks and the slimes washed on the filter frames. After the wash is effected the washing solution is withdrawn, sufficient water is added to the V-shaped part of the tank to form a sufficiently dilute pulp to run in the launders, then the valve connections are reversed and water is forced inside the filters, causing the slime cakes to fall into the bottom of the tank, whence they go through sluices to waste.



SIEMENS-HALSKE PRECIPITATION TANKS



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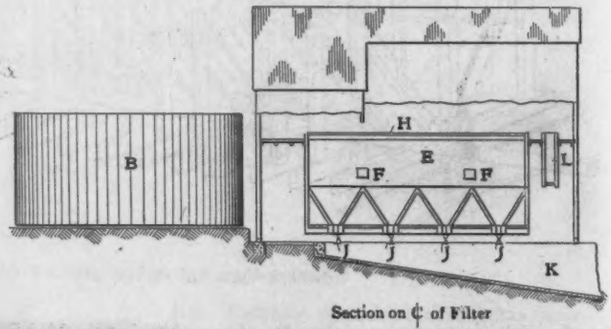
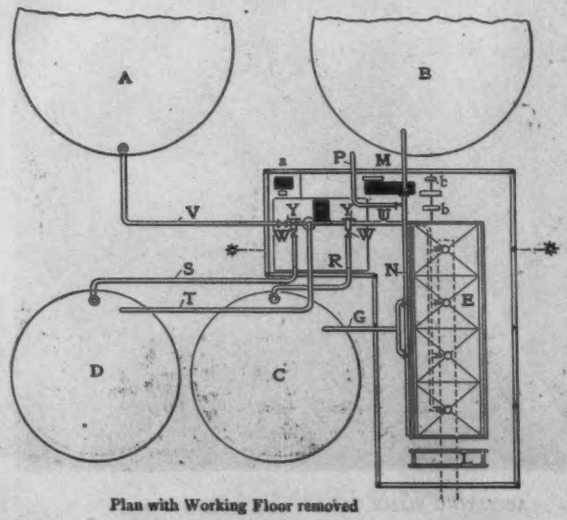


Section on ℄ of Filter

80-FRAME VACUUM FILTER PLANT



Plan with Working Floor removed

A. Stock Pulp Tank.
B. Unprecipitated Solution Tank.
C. Wash Water Tank.
D. Wash. Solution Tank.
E. 80-frame Vacuum Filter.
F. Sluice Doors.
G. Surplus Water Discharge.
H. ¾" Spray Pipe.
J. 12" Q. O. Valve.
K. Discharge Flume.
L. Acid Wash Tank.
M. 10"x14" Wet Vacuum Pump.
N. Main Suction from Filter.
P. Discharge Water Pipe, 20' Head.
Q. 8" Centrifugal Pump.
R. Suction from Water Tank.
S. Suction from Solution Tank.
T. Discharge to Solution Tank.
U. Suction from and Discharge to Filter.
V. Suction from and Discharge to Stock Pulp Tank.
W. 8" Q. O. Valves.
X. Rods for Operating do.
Y. 3 Way Cocks with 4' Sheaves.
Z. Winding Drums for Operating do.
a. 30-h.p. Motor.
b. Friction Clutch Pulleys.
d. Pulley Blocks for Lifting Frames.
e. Water Service Under Pressure.

The filtering tanks will treat 150 tons of slime per day. There are two at the mill, and at present they are run only one 8-hr. shift. They require very little attention; once every few months the frames have to be given a wash in a very weak HCl solution to remove the lime which gradually accumulates on the canvas, clogging the pores.

PRECIPITATING

Siemens-Halske electric precipitation boxes are employed for treating all the solutions and a small portion of the precipitated solution from the boxes is passed through zinc shavings in order to get a practically barren solution for final washes.

The electric precipitation boxes are 29 ft. long, 10 ft. wide and 4 ft. deep with V-shaped bottoms. Commercial tin plates are used for one pole while lead is used for the other. These are placed 6 in. between centers, there being 216 such plates 25 in. wide by 48 in. long in each box, arranged in 12 compartments. A current of 25 volts is used and at present about 250 amperes. One of these boxes can treat 10 tons of solution in one hour. The plant includes a small refinery.

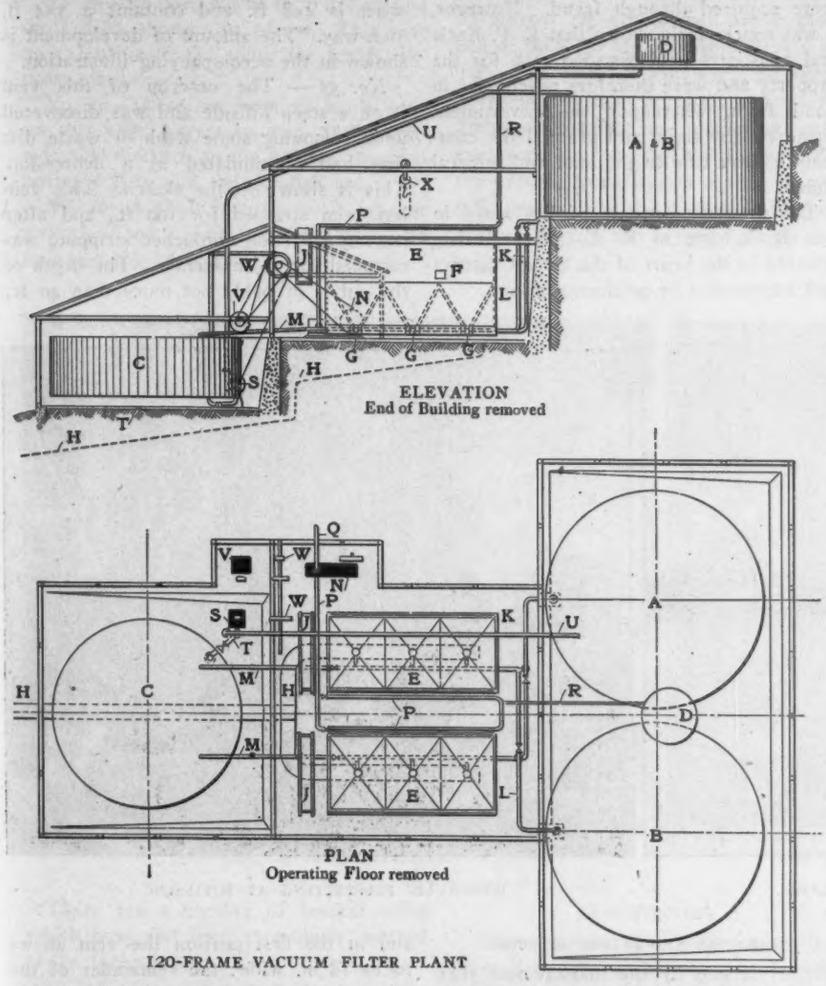
POWER AND LABOR

The power equipment of the plant consists of the following motors: a 75-h.p. and a 50-h.p. motor to run the main shafting; a 75-h.p. for the "platers;" a 15-h.p. for the wheel; a 20-h.p. for the pulping tanks and tramway; a 20-h.p. to run conveying belts; and a 5-h.p. motor is placed on both the Blaisdell excavator and the Blaisdell distributer. Power is obtained from the electric line which has been brought into Virginia City from the Truckee river.

At present only one 8-hr. shift is working on the Blaisdell machines and also only one 8-hr. shift on the filter tanks. On the other two 8-hr. shifts only one man is required at present. He attends to the solution machinery, etc.; when treating a large tonnage a few more men would be needed. The following is a list of the men working in the plant at present in 24 hr.: Three shiftmen; one Siemens-Halske box man; two men on digger (Blaisdell excavator, etc.); one filter man; and one motor man.

Except for the shoveling necessary to get rid of the last 3 in. of sands in emptying a sand tank, and the cleaning of the zinc and electric precipitation boxes, practically all the work is accomplished by machinery, which accounts for the small number of men required. All the men have to do is to tend the machinery, watch the tanks, and turn on and off solutions at the proper times.

The work of getting the old tailings into the mill is also accomplished in a very inexpensive manner. The tailings, after being loosened up with a plow or harrow, are loaded by horse scrapers into cars which are hoisted up the double-tracked incline, shown in the picture, to the bins on top.



120-FRAME VACUUM FILTER PLANT

A. Stock Pulp Tank.
B. Wash Water Tank.
C. Surplus Pulp Tank.
D. Discharge Water Tank.
E. Filters—60 Frames Each.
F. Sluice Doors.
G. 12″ Q. O. Valves.
H. Discharge Flume.
J. Acid Wash Tank.
K. Pulp Delivery to Filter.
L. Wash Water Delivery to Filter.
M. Surplus Pulp Discharge.
N. Wet Vacuum Pump.
P. Main Suction From Filter.
Q. Discharge to Gold Solution Tank.
R. Discharge Water Pipe.
S. Centrifugal Pump.
T. Suction from Surplus Pulp Tank.
U. Delivery to Stock Pulp Tank.
V. Motor.
W. Friction Clutch Pulleys.
X. Pulley Blocks.
Y. Water Service.

The Output of Mineral Products in Japan

The output of mineral products during the first six months of 1906, with the ratio of increase or decrease as compared with the corresponding period last year, according to a report of the Yokohama Chamber of Commerce, published in *The London Mining Journal*, is as follows:

	Momme (58 grains troy).	Ratio of Decrease or Increase Per Cent.
Gold	390,412	2.0 D.
Silver	9,300,713	15.8 D.
Copper	29,395,394	4.6 I.
Lead	2,920,660	55.4 I.
Tin	6,405	69.9 D.
Antimony	522,523	119.2 I.
Mercury	280	3.4 D.
	Kwamme (about 8¼ lb. Av.)	
Zinc	1,959,388	27.3 I.
Iron	7,984,658	23.8 I.
Sulphate of Iron	5,274,052	24.8 I.
Manganese	1,333,843	10.0 D.
	Kin (lb.)	
Arsenic	4,375	38.6 D.
Phosphor	405,000	100.0 I.
Black Lead	147,731	7.2 I.
	Tons (English).	
Coal	6,542,300	13.4 I.
	Koku (39.70 imp. gal.)	
Kerosene Oil	619,663	4.4 I.
Asphalt	226,500	170.6 I.
Sulphur	18,476,071	9.2 D.

Gordon-Hellman Rock Drill

Alfred Lewis, writing to the *London Mining Journal* from Johannesburg, states that the Gordon-Hellman rock drill promises to solve the labor difficulty in the Transvaal. It may take the place of the Chinese reducing the number of stoping boys required from six to one. One boy can do only one hole in a shift by the usual method, while the machine, costing £40, with one boy, does from six to nine holes during the same period. It is calculated that the expense will be cut down 2s. per ton by means of this drill.

THE NIPISSING AND FOSTER-COBALT MINES

The Two Wider Veins in the District—Hydraulic Prospecting—Abandoning Primitive Methods at the Foster Mine—Variety of Rare Minerals

BY REGINALD MEEKS

Situated in the heart of a district producing silver for about 5c. per oz., and whose ore averages better than 650 oz. per ton, is the Nipissing mine, of which comparatively little is known, despite its two years' operation. During this time more than $2,000,000 in silver has been taken out, and from less than 10 per cent. of its territory. The remaining 90 per cent. has not been prospected at all, and it is not unreasonable to predict that new veins will be discovered when it is remembered that veins have been uncovered on properties adjoining the Nipissing on all sides, and also because of the peculiar vein system or, rather lack of system, in the district.

The Foster management has been operating under the most adverse conditions, but is now installing suitable equipment to develop the property.

Nipissing Mines Company

This company was organized under the laws of the State of Maine with a capital of $12,000,000 in shares of $5 each, to take over all of the stock of the Nipissing Mining Company, Ltd., of Canada, and to act in the nature of a holding company. Of the original 2,400,000 shares one-half remained in the treasury and were to be used to acquire new property. In the early summer of 1906, the company applied for permission to cancel this treasury stock which was granted. The Nipissing Mining Company, Ltd., was formed to take over the holdings purchased by E. P. Earle and associates and later the present company was organized.

The Provincial government of Ontario brought suit against the company and attacked the claims on the ground that they were acquired through fraud. However, it was conclusively shown that E. P. Earle and associates paid $250,000 cash for the property and were therefore purchasers in good faith, whereupon the government withdrew the claim and granted the company a clean title to the land and mineral rights.

The property consists of 846 acres in lots R. L. 400, to R. L. 408 inclusive, situated in the heart of the Cobalt district and surrounded by producing mines.

NIPISSING MINE, FROM COBALT LAKE

HYDRAULIC PROSPECTING AT NIPISSING

Character and Extent of Veins

It is claimed by the management that 58 or 60 distinct veins have been discovered on the property. It seems probable that many, now called veins, will later prove to be merely branches or extensions of other veins and that all will merge into 10 or 12 distinct veins. The veins strike in all directions and, as has been remarked before, the fissure formation resembles mud cracks. On this account it does not seem unreasonable to suppose that some of the veins will eventually merge and this view is accepted by many engineers at Cobalt. The veins which have so far been exposed are as follows:

No. 49—This is the widest vein in the district and contains sensational values. The surface has been stripped for 110 ft. and the ore removed in three steps by underhand stoping. Near the surface the width of the vein is about 12 in., and at about 10 ft. in depth it widens to 48 in. At the bottom of the third step the ore is lower in silver values but latest reports state that native silver is becoming more plentiful. The mineral portion consists of smaltite containing argentite, and native silver. There is considerable earthy, black oxide of cobalt and some decomposed calcite. The total depth of the working is about 30 ft. The opening is covered with stulls and operated by a shaft house 18x36 ft. and 45 ft. high. The shaft is 4x8 ft. and contains a 3x4 ft. man-way. The amount of development is shown in the accompanying illustration.

No. 55 — The outcrop of this vein is on a steep hillside and was discovered upon removing some wash or waste dirt that had accumulated in a depression. This is shown in the sketch. This vein has been stripped for 100 ft., and after leaving a portion untouched stripping was resumed for 75 ft. farther. The depth of the cut is probably not more than 40 ft., and in the first portion the vein shows 10 to 18 in. wide; the remainder of the exposed vein is from 4 to 10 in. in width. Veins 49 and 55 will probably be found to intersect.

No. 19—The opening extends for 150 ft. and sinking is being done below the 50-ft. level. The vein widens from nothing to 10 in., with an average width of 4 in. of smaltite and native silver. There is a shaft-house similar to the one at No. 49.

No. 26—An ore-shoot has been opened for nearly 200 ft., and a 70-ft. portion to the south has been cut to a depth of 60 ft.; the balance has been cut for about 25 ft. The vein averages 4 in. in width, and it is claimed that $300,000 worth of ore has been won from this opening. A horizontal fault occurs at a depth of 40 ft. The vein was found after drifting 20 ft. to the east and sinking has been resumed.

No. 27—The ore is not uniform, and in

places are found one, two or three streaks. The vein lies about 200 ft. southeast of vein 19, and has been uncovered for 110 ft. It has been worked to a depth of from 30 to 35 ft.; the average width is possibly 5 in., and there is a good showing of native silver.

No. 54—This vein probably connects with No. 25. It has been exposed for 120 ft., and shows a width of from 1 to 5 in., with an average of about 3 in. smaltite and native silver.

No. 25—An open cut 60 to 70 ft. long and 60 ft. deep, shows 3 in. of ore. This year an extension to the south for 125 ft. exposes similar ore.

No. 40—There has been no work done on this vein, except to strip for a considerable distance on the surface, thus exposing a 3- to 4-in. vein of rich ore.

No. 10—A shaft is down 40 ft., and at a depth of 100 ft. a cross-cut will be run to intersect No. 26 vein.

SHAFT-HOUSES AND POWER EQUIPMENT

There are at present five shaft-houses, and another is in course of construction. This shaft-house, when completed, is intended to operate a number of veins in one district by cross-cutting and then drifting along the vein. The veins thus intersected are known as Nos. 15, 21, 12, 13, 40, 53, 44, etc. Nos. 49, 55, 26 and 19 have their own shaft equipment.

One of the handicaps which has not yet been overcome is the shortage of men. At present 175 to 180 men are employed and of these 50 are mining and 25 mucking. The rest are employed on surface development, ore sorting, construction, timbering, teaming and lumbering, and as engineers, firemen, machinists, etc. With the present force it is a matter of great difficulty to clear the land and attempt to prospect nearly 800 acres of virgin territory.

the veins being near one another. At each shaft there is a small boiler-house with a capacity sufficient to operate the bucket hoists.

The camp is provided with a combination bunk-house, cooking establishment and dining hall accommodating more than 200 men. Four smaller bunk-houses provide quarters for the men. There are also 16 buildings, including superintendent's house, and office, three ore-houses, a sampling works under construction, club-house for the men, assay office, etc.

CHARACTER OF ORE

The ore is principally argentiferous smaltite and native silver, but there is also found argentite, niccolite, native bismuth, dyscrasite or artimonide of silver (Ag_6Sb), erythrite or cobalt bloom, annabergite or nickel bloom, and the white "bloom," which is a combination of the two.

NO. 19 VEIN, NIPISSING

VEIN RUNNING INTO THE LAKE, NIPISSING

There are a number of smaller veins which have not been as actively worked as the foregoing.

METHOD OF MINING

Up to the present time all the veins have been worked by under-hand stoping in open cut. In a number of instances the work has progressed in steps, and owing to an inadequate force of men has necessarily been restricted. There has been very little machine-drilling in the open cuts, and a good many veins have been temporarily abandoned, while work has been pushed on others. Although one of the first mines to be operated, the workings are very shallow, the deepest cut being only about 80 ft. in depth.

Hand-drilling is being rapidly abandoned, and within the last few weeks many machine-drills have been installed, and stoping is rapidly progressing. The new power plant is in operation, and with the increased facilities, there should be a marked improvement in mining methods.

PROSPECTING

The veins on the Nipissing property have been discovered either by trenching or by means of the hydraulic plant. The latter consists of a pumping station on the shore of Petersen lake, containing a 150-h.p. engine, boilers and a pump. The washing away of the surface soil would be accomplished more readily if the pressure were higher. However, the experiment of prospecting in this manner was the means of uncovering several new veins.

POWER PLANT AND EQUIPMENT

The power for operating the various workings in lot R. L. 404, where most of the discoveries have been made, is centralized in one plant. This does not include the pump station before mentioned. The equipment at this power-house consists of two 125-h.p. boilers, and one 20-drill Canadian-Rand air compressor. The air supplied by this compressor will be piped only a comparatively short distance,

The first grade of ore averages as high as 2300 oz. silver, and is usually shipped in large oil casks. There were 45 such casks ready for shipment at vein 49 in December. The average value of the second grade is 150 oz. silver, and the dump will show rock which will probably assay from 60 to 75 oz. There are several hundred tons of ore ready for shipment at the property. The cost to produce ore, all development and construction expenses included, is stated to be approximately $100 per ton.

In the summer the sacked ore is transported across Cobalt lake in boats, and when the ice on the lake is strong enough, sleds are used. It is rumored that the railroad intends to run a branch to the east, which would be of great benefit to the Nipissing company.

A recent meeting of the board of directors resulted in the election of the following officers: Samuel Newhouse, president; W. B. Thompson, vice-president; David Fasken, secretary; F. W. Holmes,

treasurer. W. H. Linney remains superintendent at the mine.

FOSTER COBALT MINING COMPANY, LTD.

In June, 1905, Clement A. and Albert Foster took out a claim consisting of 40 acres on the shores of Glen lake and near Giroux lake; 13 acres are under water. The property is situated in the eastern portion of Lot 4, concession 4, Coleman township. Later a company was organized with a capital consisting of 1,000,000 shares of stock, the par value being $1 each.

This mine was among the first in the district to produce. Since reorganization the present company has shipped two cars of first-grade ore, one car of second-grade and one containing a mixture of cobalt ore and fines. Previous to this C. A. Foster shipped 100 tons of ore; the total returns to date have been from 220 tons of ore.

VEINS ON THE PROPERTY

Six veins and three cross-veins (from vein No. 5) have been discovered on the

VEIN NO. 26, NIPISSING

Foster property, and these have been worked by both open cut and by sinking and drifting along the vein. Power facilities have been of the crudest type, but a plant is being installed and will greatly facilitate the extraction of the ore. When the mine was visited one vein was worked by a hoist operated by one horse hauling on a rope over a single pulley. The rest of the veins were equipped with ordinary hand-windlasses.

Vein No. 1—A cut 70 ft. long at the south end of the property has exposed a vein along the surface which strikes northwest-southeast. The width of the vein averages 6 in. and shows fair values of silver in smaltite.

Vein No. 2—A shaft has been sunk to a depth of 70 ft. and a drift to the south along the vein for 108 ft. terminates in a raise or air-shaft to the surface. They have also drifted for 45 ft. 60 deg. west of south. For a distance of 20 ft. from the shaft and along the vein, the ground has been stoped out to the surface. The vein varies in width from 5 to 10 in. and shows an average of 6 in. of smaltite and native silver, containing some argentite and pyrargyrite or ruby-silver.

Vein No. 3—A 60-ft. open cut exposes this vein which strikes north-south and then turns 45 deg. to the southeast. It is situated in the eastern part of the property and shows 3 to 4 in. of argentiferous-smaltite.

Vein No. 4—Little more than stripping for 100 ft. has been done showing a vein 2 to 5 in. wide.

Vein No. 5—The ground has been stripped for 100 ft. and shows a vein, from 4 to 14 in. wide, striking northwest-southeast; this vein branches and these have been traced for 25 ft. One of them enters the University property; the other has not been traced for its possible length. The branches are about 2 in. in width and contain smaltite and possibly silver. There are also the cross-veins referred to above.

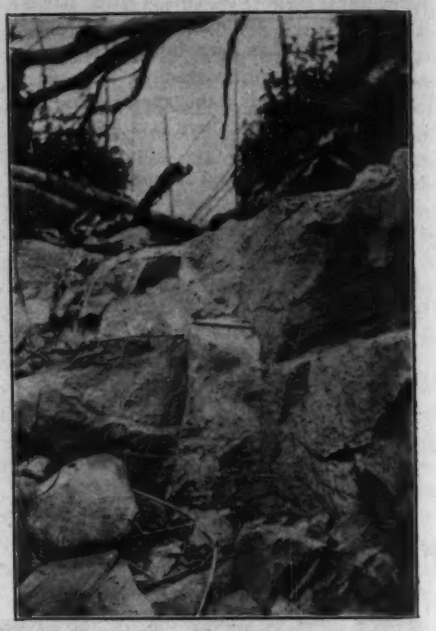
Vein No. 6—A shaft has been sunk to a depth of 78 ft. on this vein and drifting for 20 ft. to the southwest and 15 ft. to the northeast, along the vein, is all the development which had been done up to December, 1906. The vein averages 2 in. of smaltite and silver and there are good values in the wall-rock.

POWER EQUIPMENT

The simple methods of hoisting and hand-drilling are to be abandoned and a more adequate power plant was being installed. This consists of two 60-h.p. tubular boilers; one 10-drill compressor; 3 hoists; one electric-light generator set; three 3-in., and four 2¼-in. air-drills.

Besides the power-hose, the mine is furnished with a bunk-house, boarding-house, stable, ore-house, office, etc.

A force of 45 men works in two 10-hour shifts, 24 men on underground development and the others on construction, ore-sorting, etc.



THE LAWSON VEIN

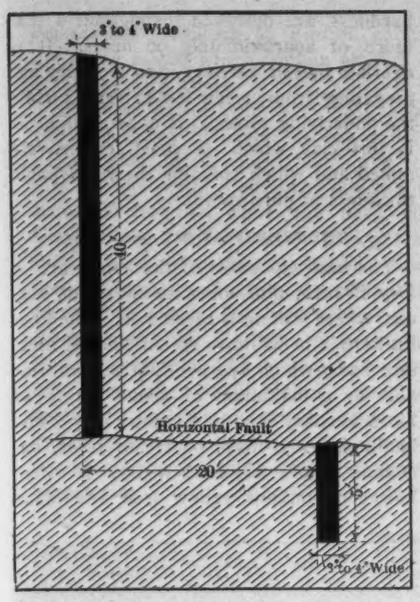
The officers are as follows: President, W. K. George; vice-president, W. H. Blake; general manager, H. G. Adler; J. G. McMillan, superintendent.

Regulating Mill Returns in the Transvaal

BY A. SELWYN-BROWN

The banket formation, which supplies the largest proportion of the Transvaal gold ore, contains the gold in irregular pockets. As a consequence, in order to secure regular mill returns, it is necessary to "sweeten" the ore going to the mills. Much of the ore assays below 5 dwt. gold per ton, and this is unprofitable at the

BAILEY MINE, FROM THE FOSTER-COBALT MINE



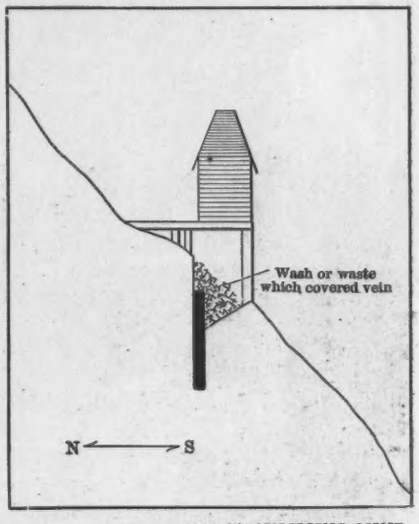
HORIZONTAL FAULT, VEIN NO. 26, NIPISSING MINE

present high working costs. Such ore has to be "sweetened" by rich ore taken from a pocket, or bonanza, to bring its value up to about 7 dwt. per ton.

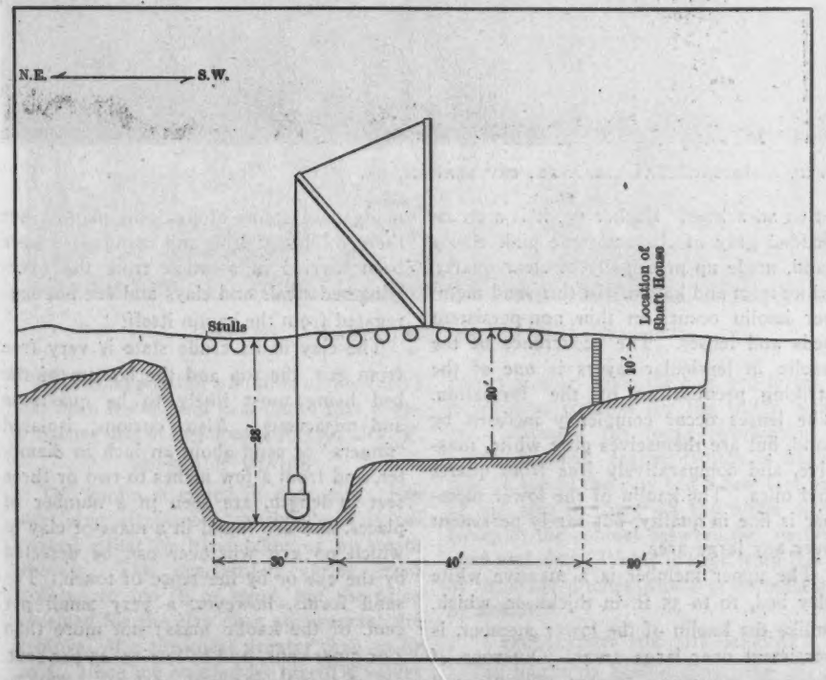
None of the companies supplies its shareholders with adequate information regarding the values of the ore found during development operations. The annual reports are full of figures of a general nature, or give the detailed costs of mining and milling; but investors are left absolutely in ignorance regarding the value of the ore in the mine, with the exception of the estimates, in round numbers, of the ore developed, which are appended to the manager's report, and the usual eulogistic predictions regarding future yields with which the chairmen end their speeches at the directors' annual meetings.

This serious lack of detailed information regarding the results of prospecting operations, and the value of recently exposed orebodies is being severely criticized in England, and the criticisms have so injuriously affected share values that some of the leading South African share operators on the exchange have induced a number of mining directors to explain the causes of the great secrecy enveloping mining strikes.

One of the clearest statements was recently made by the chairman of the Langlaagte Deep Company, at the ninth annual meeting in Johannesburg. In reply to the critics, and in defense of the company's actions, he said: "It is the practice on the Witwatersrand to regulate the declared gold yield so as to keep up a uniform grade based on the assay value of the payable ore developed, and only gradually to modify the grade as development shows any appreciation or depreciation in the value of the ore reserves. Although taken over a long period the average yield called for by the assay plan is, as a rule, approximately obtained, considerable variations occur from month to month and might, if published, give a false impression as to the real condition of the mine and lead to misconstruction—more particularly at times of active share dealing. These fluctuations may be caused by a variety of circumstances, such as unusually rich or poor patches in the stopes that are being worked. Experience has proved that the distribution of gold in these mines, although wonderfully even over a large extent of ground, is often most erratic over small areas. It must also be remembered that the process of gold extraction is a continuous one covering a certain length of time, and that the gold recovered in any given period is not the actual product, nor is it all the recoverable product, of the ore milled in that period. When the month begins there is on the plates and in solution a considerable quantity of gold from the ore milled previously, and in the same way at the end of the month there is left on the plates and in solution a certain quantity of gold which will be recovered with the contents of the ore milled in the following month. These are reasons why declarations for such a short period of time as a month may be unduly inflated or contracted, and are therefore apt to mislead shareholders. In order to guard against these fluctuations the policy was adopted—with the knowledge and consent of the Government—of keeping in reserve a certain quantity of gold in very good months in order to level up the results of poor months. This practice was the result of careful and anxious consideration, and it achieves the object aimed at as far as it is possible to do so; that is, it gives the shareholders and the public as accurate an idea as can be given of the normal yield of the various mines, and it is undoubtedly a protection to shareholders as it tends to give stability to their investments. It has been urged that the practice of keeping any gold in reserve without publishing the fact may be open to criticism, and therefore in future we intend, as far as the companies in the Rand mines and Eckstein groups are concerned, to give with the declaration of the monthly output a statement of the reserve gold account, such as has always been given in the official returns to Government."



OUTCROP OF VEIN NO. 55, NIPISSING MINE



LONGITUDINAL SECTION OF VEIN NO. 49, NIPISSING MINE

The practice of "sweetening" mill returns is not confined to South African mines, but is universally adopted wherever mining properties are operated in a regular and systematic manner. It is the mystery regarding the results of development work that calls for censure in South Africa.

KAOLIN MINING IN GEORGIA*

The Deposits, Method of Mining and Preparation for the Market

BY OTTO VEATCH†

Some activity is being manifested in the mining and shipping of high-grade paper and pottery kaolins of the Cretaceous formations of Georgia. In the two States of Georgia and South Carolina, there exist, perhaps, the most remarkable beds of sedimentary kaolin in the United States, both as to the purity and extent of the clay. The kaolin in Georgia is, at present, being mined in large quantities at two localities, Dry Branch and Hephzibah. Besides, there are a number of other localities where occasional mining is carried on. About 25,000 tons are mined annually.

CLAY BED, AMERICAN CLAY COMPANY, DRY BRANCH, GA.

THE POTOMAC BEDS

The best kaolins occur in the Potomac formation, a narrow belt of kaolinic sand, gravel and clay, which lies in contact with the crystalline rocks of the Piedmont plateau, and extends in a northeast-southwest direction the entire width of the State. The Potomac is the basal member of the Cretaceous, and probably occupies the same geological position as the Potomac of Virginia and Maryland. Eastward from Macon, Georgia, the Potomac is frequently overlapped by tongues of Eocene strata, and is much obscured by superficial deposits of post-Tertiary sand, and is revealed only by stream erosion and artificial cuts.

The Potomac varies greatly in thickness, from 50 to 500 ft. The eastern belt, or that part lying between Macon and Augusta, Georgia, is divisible into a basal kaolinic sand and gravel, 50 to 400 ft. thick, and an upper clay member, 10 to 35 ft. thick. The basal member, near the contact with the crystalline rocks, consists of coarse clayey gravel and sand, often an arkose. Higher up, it is a cross-bedded gray of characteristic pink clayey sand, made up principally of clear quartz, white mica and kaolin. In this sand member kaolin occurs in thin non-persistent beds and lenses. The occurrence of the kaolin in lenticular layers is one of the striking peculiarities of the formation. The lenses occur completely inclosed by sand, but are themselves pure white, massive, and comparatively free from quartz and mica. The kaolin of the lower member is fine in quality, but rarely persistent over any large area.

The upper member is a massive white clay bed, 10 to 35 ft. in thickness, which, unlike the kaolin of the lower member, is persistent over large areas. Outcrops of this bed, in varying degrees of purity and hardness, are observed throughout a distance of approximately 90 miles. It is overlain by red Tertiary sand and clay aggregating from a few feet to 200 ft.; while the underlying material is quartz sand. It is this clay which is most extensively mined and which contains the remarkable thickness of pure kaolin.

THE DEPOSIT AT DRY BRANCH

The best exposures of the kaolin are at Dry Branch, nine miles southeast of Macon, where mining is carried on. The kaolin here is in white to cream-colored massive beds, which are overlain unconformably by a maximum of about 100 ft. of loose Tertiary sand and impure clay. The kaolin is gray, drab, or cream color, becoming a pure white when dry. It often, however, contains yellow iron and black manganese stains along joint planes; but these oxides of iron and manganese have been carried in solution from the overlying red sands and clays and are not segregated from the kaolin itself.

The clay in its crude state is very free from grit, the top and the bottom of the bed being most likely to be quartzose and micaceous. Also, curious, isolated "fingers" of sand about an inch in diameter, and from a few inches to two or three feet in length, are seen in a number of places, and are found in a mass of clay in which no grit whatever can be detected by the eye or by the sense of touch. The sand forms, however, a very small per cent. of the kaolin mass; not more than 4 or 5 per cent., and as low as .45 per cent. are shown by rational analyses. This is

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†Geological Survey of Georgia, Atlanta, Ga.

remarkable inasmuch as Florida kaolins are being mined which contain as high as 75 per cent. of sand.

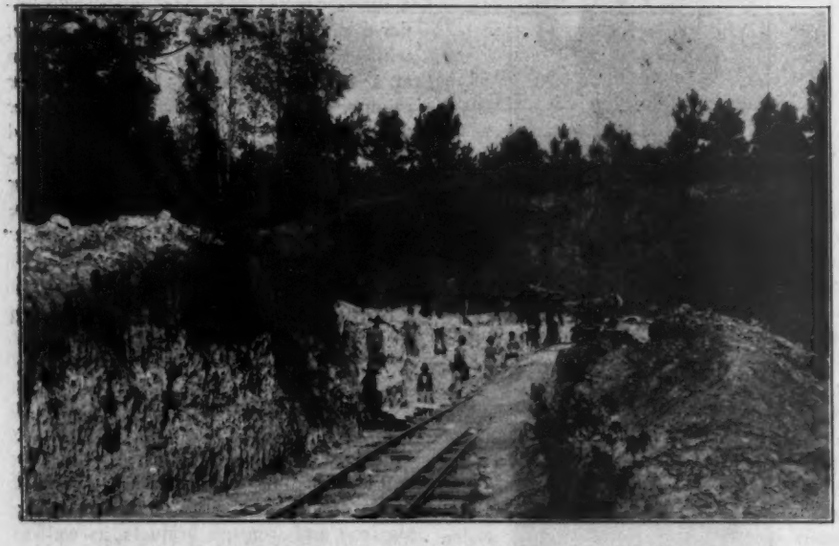
The clay varies from very soft, about the consistency of cheese, to too hard to be scratched by the finger nail. The soft clay breaks with a peculiar fan-like or dendritic fracture, while the hard clay breaks with a conchoidal or hackly fracture. In some localities the kaolin has become indurated to such an extent that the term "flint kaolin" has been applied to it. Such clays break like flint, resist the action of weather and have almost no plasticity, even when finely ground. Soft and semi-hard kaolins predominate, however.

The following analysis shows the purity of the clay in its crude state, and is representative:

	Per Cent.
Moisture at 100° C	1.222
Loss on ignition	13.469
SiO_2 (total)	44.767
SiO_2 sand	(.680)
Al_2O_3	38.411
Fe_2O_3	.639
CaO	.209
MgO	.093
Na_2O	.096
K_2O	.355
TiO_2	1.379

Rational analysis:

	per cent.
Feldspar	0.680
Mica	4.509
Ferric Oxide	0.479
Soluble Silica	3.189
Clay Substance	91.143



CLAY PIT, ATLANTA MINING AND CLAY COMPANY

The fusing point of a number of these clays has been tested, and it is found that it approaches that of Seger cone 36, 3362 deg. F.

METHOD OF MINING

The kaolin is mined in open pits. The overlying strata, or "overburden," is removed either by hand labor or by steam shovels. The overburden varies from nothing to 100 ft. or more, but the price received for the clay does not warrant the removal of a thickness greater than 30 or 40 ft., since the overburden itself is valueless. After a face has been exposed and the overburden stripped off for a few feet back from the face, the clay is mined with broad-pointed, curved picks and shoveled into cars. The clay is broken off in flat chunks one to two feet in length. Blasting with powder is rarely resorted to, since the clay is blackened thereby and on account of the softness and elasticity of the clay only small quantities are torn off. The jointing is taken advantage of and large wooden or iron stakes are driven back from the face and large masses thus forced off. Drainage is one of the difficulties in kaolin mining, since the clay bed forms an impervious stratum for the water, which seeps through the loose overburden of sand. A small drainage ditch is usually dug on top of the clay bed a few feet back of the face to carry off the water which issues at the contact between the overlying sand and clay. Water is kept from the pit by drainage ditches where practicable and by pumps.

PREPARATION FOR THE MARKET

The kaolin is hauled from the pit in large chunks to long, open drying sheds, where it is placed in racks and the air allowed to circulate freely through it. After a few weeks of drying, it is either shipped in bulk or is crushed into flour and small chunks and shipped in sacks and wooden casks.

The kaolin is shipped largely to northern markets, and is used in the manufacture of paper and pottery. The soft, flour-like kaolins are most suitable in paper manufacture, where they are mixed with the wood pulp and act as a filler and give weight. Some of the lower grades are shipped to terra cotta and fire-brick manufacturers.

DRYING SHED, ALBION KAOLIN COMPANY

The German Cement Trade

In Germany there is a feeling of elation over cement prospects. A majority of the portland-cement manufacturers have formed themselves into groups or syndicates to promote the industry. Rudolph Dykerhoff, the well known manufacturer, writes to *Cement Age* that owing to the great impulse given to building construction the demand for cement has been extensive and a majority of the works have been fully engaged to meet it. Selling prices have advanced, but unfortunately for the manufacturer, as formerly stated, this advantage has been offset by the increased cost of the materials which enter into the manufacture of cement, and a general advance in wages, etc. There is also complaint concerning the introduction and sale of low-priced natural cement from Belgium, which is sold as portland cement.

The newly discovered copper deposits at Mount Carmel, in the Heathcote district, Victoria, are receiving much local attention. They are believed to be extensive, permanent and rich, the surface indications being traceable for miles. The country has been pegged out for about 7 miles, but so far only a moderate amount of development work has been done.

A Vertical Intercooler for Air Compression

A vertical intercooler built by the Ingersoll-Rand Company for use with two-stage air compressors is said to be equally efficient when employed as an ante-cooler or an after-cooler. The half-tone, Fig. 2, gives an external view and Fig. 1 is a sectional view showing the connections and appurtenances. The cooling water enters at the bottom, fills and flows slowly upward through thin brass tubes and overflows by a pipe at the top. The balance of pressure is outside and the tubes are

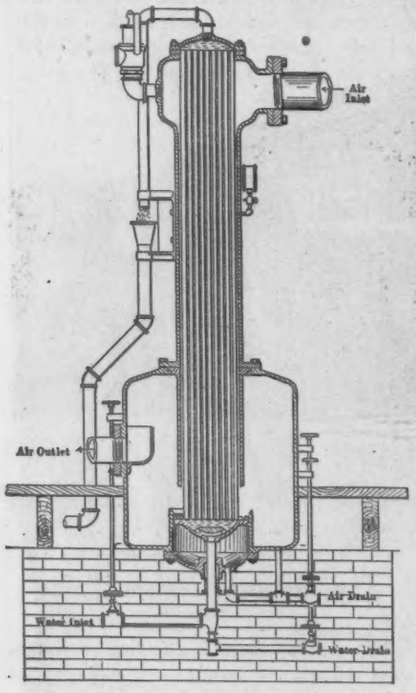


FIG. 1. INGERSOLL-RAND INTERCOOLER, WITH CONNECTIONS AND APPARATUS

of thin brass. Any sediment which may collect in the lower water chamber is drawn off by the water drain. The upper head, into which the brass tubes are expanded and riveted, is held securely by the dome cover which is bolted over it, but the lower tube head is free to move up or down, as the expansion or contraction of the tubes may require. The central water pipe enters the bottom through a stuffing box, and when a slight movement occurs, the outside piping is always sufficiently yielding.

The air enters the intercooler at the top and passes out near the bottom, the final contact with the cooling tubes being where the water is at its lowest temperature. The air enters the upper chamber, striking across and spreading around and among the tubes, passing down the body of the intercooler through a space filled with tubes and so restricted that no eddying is possible. The shape of the body is continued by a petticoat down nearly to the lower ends of the brass tubes, where the air enters a large settling chamber. The air passes out from near the top of the chamber by the inverted elbow seen at the left in Fig. 1.

The various pipes are not necessarily placed as indicated, but, provided that their various functions are not interfered with, may be placed wherever the connections may be most convenient. The intercooler is easily taken apart for examination, cleaning, repair or renewal. The tubes may be lifted out upon removal of the top cover if there is sufficient hight for the lift. If the joint at the top of the lower chamber is broken, only about one-third of the high lift is required. The large capacity of the lower chamber gives it considerable value as an air receiver, although it is not intended as a substitute for the regular receiver. This intercooler is made in all required sizes; for higher pressures or for three- or four-stage compression the shell is made of corresponding strength.

First Cost of Mechanical vs. Chimney Draft

It is extremely difficult to make a general comparison of the first cost of a chimney with that of a mechanical-draft plant, because of the fact that most chimneys

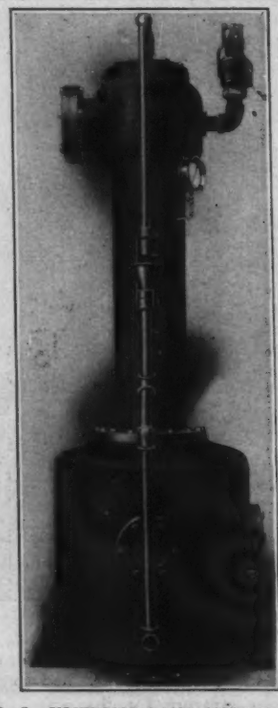


FIG. 2. INGERSOLL-RAND INTERCOOLER

for power plants are usually put up with a view of obtaining a draft from 0.5 to 0.75 in. of water, while mechanical-draft systems are seldom installed except to give a draft of not less than 1 inch, says J. H. Kinealy in "Mechanical Draft." A chimney to give a draft of 0.75 in. must be about 125 ft. high, and one to give a draft of 1.5 in. would probably have to be at least 250 ft. high. The cost of the higher chimney would be very much greater than that of the lower.

In the case of a mechanical-draft apparatus, however, the apparatus to supply the air for the combustion of a given quantity of coal per hour under a maximum draft of 0.75 in. would be larger and cost more than the apparatus to supply the air for the combustion of the same quantity of coal under a maximum draft of 1.5 in. The diameter of the fan wheel for the higher draft would be only about 0.83 of the diameter of the fan wheel for the lower draft, and the dimensions of the engine, assuming it to be direct connected to the fan, might also be smaller for the higher draft. The work done in running the fan for the higher draft would be twice as great as that for the lower, and hence the running expenses would be almost twice as great; but even then the running expenses would be small. Thus to supply air for the combustion of about 5000 lb. of coal per hour, with an economizer under a maximum draft of 0.75 in. of water, an induced mechanical-draft apparatus would require a fan with a 7-ft. wheel; while to supply air for the combustion of the same quantity of coal under a maximum draft of 1.5 in. a fan with a wheel 6 ft. in diameter would be more than ample, and a 5½-ft. wheel would be almost large enough. The 7-ft. fan would have to be run at a speed of 195 to 200 revolutions per minute and would require a direct-connected engine having a cylinder 6 in. in diameter, with an 8-in. stroke; while the 6-ft. fan would have to be run at a speed of about 325 revolutions per minute, and an engine having a cylinder 6 in. in diameter and an 8-in. stroke would be more than ample for it, because of the greater number of revolutions made per minute. The dimensions of the engine are based upon the supposition that the boiler pressure would be at least 100 pounds.

Combination of Swedish Iron Producers

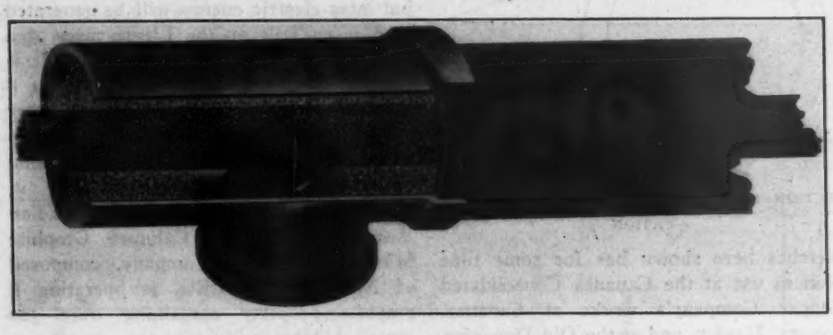
Consul R. S. S. Bergh, of Gottenborg, says that it is reported that the recently organized Aktiebolaget Jernexport is intended to be a combination of several of the largest Swedish iron works producing pig iron and iron-ore briquets, as well as of producers of steel and Lancashire iron, for the purpose of reducing competition with one another in foreign markets.

It is said that sales will be made direct by the Swedish works as well as from the Metallurgiska Patentaktiebolaget's plants in other countries. It is also the intention to obtain new markets for Swedish export of iron, and particularly for ore briquets. The company will establish offices in Sheffield, Hamburg and Paris, and at some place in the United States not yet decided upon. Besides this the company will also have agents in Japan, India and China.

Sectional Tile Conduits for Steam Pipes

The H. W. Johns-Manville Company, 100 William street, New York, is placing upon the market a sectional tile-pipe conduit for steam pipes running underground. This is known as the "J-M" Portland Sectional Conduit, and consists of tile-pipe made in top and bottom sections, the division being made by cutting half through the shell of the pipe before it is baked, and breaking afterward. The use of neat hydraulic cement makes practically a perfect-looking piece. As the top and bottom sections are numbered to correspond the same sections can always be mated.

The inclosed pipes are supported by tee sections which are placed in the line of conduit from 12 to 18 ft. apart, depending upon the size of pipes inclosed. These supporting tee sections are placed firmly on a bed of concrete which is carried up into the supporting tee section, the concrete holding the metal roll frame carrying the rods and rolls upon which the pipes rest, thus the entire weight of the pipes and their contents is entirely independent of the conduit itself.



PORTLAND CONDUIT. SECTIONAL VIEW OF TEE SECTION

The conduit with supporting tees and roll frames are laid section by section until a line is completed, and then the pipes are put in place and tested, after which the insulation may be applied. This insulation may be of either the sectional-pipe covering form, or the Asbesto-sponge conduit filling, with which the entire remaining space in the conduit about the pipes is filled. This insulation is applied while the top sections of the conduit are being applied length by length.

It is customary to place under this conduit an underdrain to remove the surplus water, which would otherwise lie against the conduit and absorb the heat. If it is found desirable to open the conduit after its installation for inspection, this can be readily done.

The conduit is water, fire and acid proof and no opening of the joints is caused by any movement or weight of the pipes on account of the form of support provided.

Tests have been made to determine the loss of heat in transmitting steam underground in this form of conduit. The most recent test which was made by George H. Barrus, expert and consulting engineer, of Boston, has shown that the loss of heat was less than that usually found in pipes installed in buildings with the best commercial grades of sectional-pipe covering to be had in open market.

The Cement Industry in Great Britain

As has been stated, there is the conviction on the part of some in England that the cement industry has a better prospect than has been the case for years. The chief problem is whether it is destined to be permanent.

As an indication of improved conditions, so far as they pertain to the export trade, the following table is going the rounds of the British press:

EXPORTS OF BRITISH CEMENTS, 1904 AND 1905

South Africa, tons	83,629	85,019
India	87,685	97,864
New Zealand	24,805	28,351
Australia	16,292	15,432
Canada	15,561	28,303
Argentina	15,014	17,688
Brazil	6,445	13,919
United States	5,073	11,590
Netherlands	1,925	5,319

Concerning industrial and scientific progress in England, Mr. Bertram Blount, in an address on this phase of the industry delivered in London last June, presented an exceedingly interesting review of the situation. Mr. Blount, who is one of the highest authorities in England on the subject of cement, spoke in part as follows:

"The great producing centers, especially those in this country and in Germany, which had been developed rapidly on the strength not merely of their command of their home market, but also on their reliance on a great export trade, found themselves gradually opposed in those countries to which they were accustomed to export cement by a growing local manufacture, and in consequence had to be content with a non-progressive or diminishing export, or were obliged to lower their prices in foreign markets to a point that was barely remunerative. This natural shifting of the center of gravity of the cement industry, if it had taken place gradually, would have inflicted little injury to those manufactories whose position was economically sound; but it happened, during the time I am dealing with, that the largest single customer for exported cement—the United States—took up and developed its home manufacture on so huge a scale and with such rapidity that the European works found themselves deprived of an outlet for a large part of their product with inconvenient celerity, losing a valuable consumer before they had time to find or create other directions in which their cement might be profitably disposed of.

Mine Accidents in Great Britain

The advance proof of the statement, compiled by the British inspectors of mines for the year 1906, gives the total number of persons killed in mines and quarries for two years past as follows:

	1905.	1906.	Changes.
Coal mines	1,159	1,133	D. 26
Metal mine	46	37	D. 9
Quarries	99	97	D. 2
Total	1,304	1,267	D. 37

As the number of persons employed is not given, the ratio of deaths cannot be ascertained.

In quarries, which include all open workings, the chief causes of accident were as follows, in 1906:

	Number.	Per Ct.
Falls of ground	39	40.2
Blasting	11	11.4
Falling from ledge	10	10.3
Miscellaneous	24	24.7
Surface, or outside	13	13.4
Total	97	100.0

It will be seen that the surface, or outside accidents, formed only a small proportion of the total.

The causes of accidents in metal mines are shown in the following table:

	Number.	Per Ct.
Falls of ground	11	29.8
Shaft accidents	8	21.6
Miscellaneous	12	32.4
Surface	6	16.2
Total	37	100.0

All but one of the shaft fatalities were the result of falling from the surface, or from cages or hoists.

The coal-mine accidents were naturally the most numerous, as coal is the greatest mining industry. The more prominent causes of these accidents will be found in the table given herewith:

	Number.	Per Ct.
Explosions, gas or dust	54	4.8
Falls of ground	547	48.3
Shaft accidents	68	6.0
Trams and tubs	185	16.3
Miscellaneous	144	12.7
On surface	135	11.9
Total	1,133	100.0

The year was free from any extensive explosions of gas or coal-dust; none of those reported caused more than two or three deaths. Falls of ground were the most important cause of death, the total number reported for all classes of mines being 597, or 47.1 per cent. of the whole number of fatalities. On the surface, the chief cause of accident was found in the movement of cars and locomotives.

The Snowstorm Copper Mine

BY ROBERT N. BELL*

The most important progress in Idaho's copper-mining development during 1906 has been at the Snowstorm mine, three miles from Mullan in the Cœur d'Alene district. The orebody resembles in size the great tabular lead-silver ore shoots of Cañon Creek on its strike to the west. It is a steep, pitching fissure, with a very pronounced footwall that cuts the thin, bedded quartzites at a quartering angle. The ore shoot shows a very indefinite outcrop high up on the steep mountain slope, and has been developed by three crosscut tunnels to a total depth of about 1200 ft.

For 600 ft. of this depth the ore was a uniform dissemination of clean copper carbonate impregnating the grain of the quartzite. One hundred feet below the middle tunnel the ore rapidly changes from a carbonate to the equally uniform dissemination of very fine-grain bornite and chalcocite, which seems to have transformed the rock back into a sandstone. A highly magnified thin section of this ore was recently illustrated in the *Mining and Scientific Press*, which shows these rich secondary minerals occupying the interstices between the sand grains, replacing the cementing silica and not the original sand grains, a very significant condition that may mean more important secondary enrichment at greater depth in the vein. Between the No. 2 and No. 3 tunnels there are four intermediate levels in which there is now blocked out a million tons of ore of shipping grade.

The shoot at these horizons of the mine is over 600 ft. long, and from 5 to 50 ft. wide. Where the sulphide ore is encountered it shows a pay streak 12 ft. wide, carrying from 10 to 12 per cent. copper. The shipping ore, of which 80,000 tons were sent out to the smelters during the past year, carries over 90 per cent. silica, 5 per cent. copper and about 5 oz. silver per ton. It is used for converter linings, for which purpose it is in good demand. A new compressor plant has recently been installed of 20 drills capacity, to be run by water power, also a new aërial tramway connecting the No. 3 tunnel with the railway at Larsen siding and other improved equipment which will admit of greatly increased productions during the year.

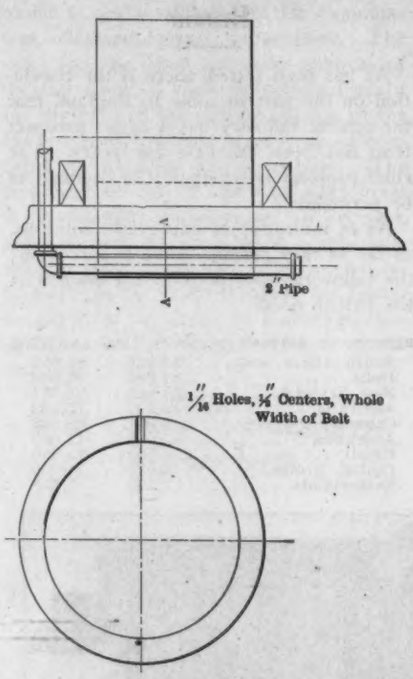
The property is also equipped with a leaching plant for treating its low-grade ores, of which there is a vast reserve. This is now in successful operation, and recently made an important shipment of high-grade precipitates.

The influence of molybdenum in nickel steels is similar to that of tungsten, but with quenched steels the results are not so good.

*State inspector of mines, Boisé, Idaho.

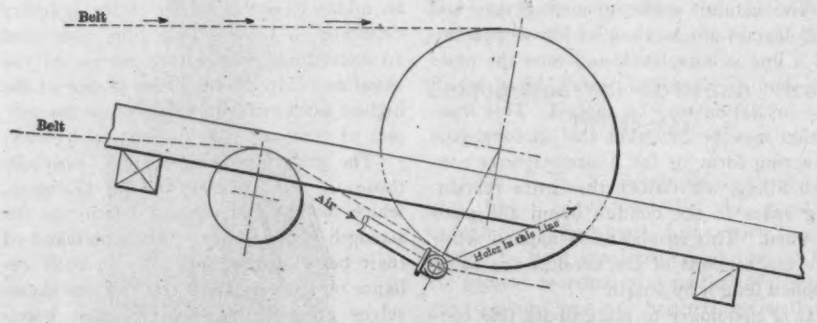
A Device for Cleaning Conveyer Belts

Compressed air for removing wet and sticky materials from belt conveyers has been found effective when the usual method depending upon the use of brushes failed. The device illustrated in the sketches here shown has for some time been in use at the Cananea Consolidated Copper Company's works at Cananea, Sonora, Mexico, and at the Old Dominion Copper Mining and Smelting Company's plant at Globe, Ariz. As far as known all credit for the method and its application is due Chas. F. Shelby, superintendent of the reduction division of the Cananea Consolidated Copper Company.



SECTION OF AIR PIPE AND MODE OF APPLICATION

The device depends upon the impact of compressed air; the method of application is clearly shown in the sketches. Air under a pressure of 90 lb. is brought to the belt at a point immediately below the return pulley. The pipe is provided with 1/16-in. holes spaced by ½-in. centers, on the side opposite the belt and extending the entire width. The force of the air escaping through the 1/16-in. holes effectually clears the surface of the conveyer.



POSITION OF THE PIPE BELOW THE BELT

Graphite Mining in Canada

BY FRITZ CIRKEL*

Graphite mining promises to become an active industry in Canada. The Diamond Graphite Company, of which J. J. Tonkin, of New York, is president, has acquired several hundred acres of graphite lands five miles north of Buckingham, Quebec. These graphite properties have been known for more than twenty-five years. The graphite is of the flaky variety and occurs in a rusty, laminated gneiss. A number of prospecting ditches, open cuts and drill holes have proved the deposit to be of large extent. A 100-ton mill for the treatment of graphite rock is almost completed. The main building of the mill is 72x26 ft. square and will receive the ore from an inclined tramway. The mill proper is divided into several sections, each driven by a separate electric motor. The motive power will at first be steam, but later electric energy will be generated at Masson falls on the Lievre river at a distance of 8 miles from the mill. It is calculated that the mill will turn out 8 tons of finished product per day. Another 100-ton mill for the same company is in course of construction on another graphite property near by.

At Calumet station on the Canadian Pacific railway, the Calumet Graphite Mining and Milling Company, composed of American capitalists, is operating a graphite property containing over 300 acres. A large mill is in process of construction, the building being 60x90 ft. A new departure in this mill will be pebble-tube mills for the cleaning and polishing of graphite flakes.

It is announced that a financial interest has been taken by two Belgian companies in the Mines de Saint Pierremont, a French company, which has been formed at Maneieulles, for the opening up of iron-ore fields in the basin of Briey, French Lorraine.

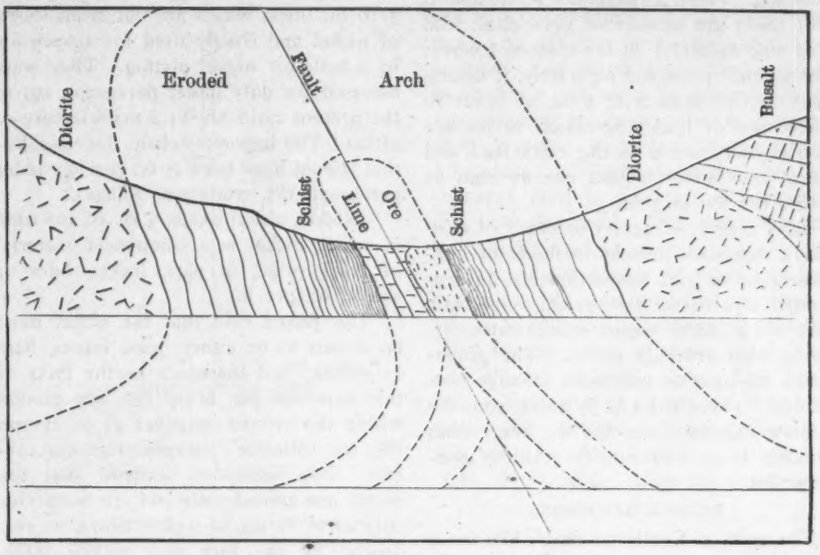
*Mining engineer, Montreal, Canada.

South Mountain, Idaho

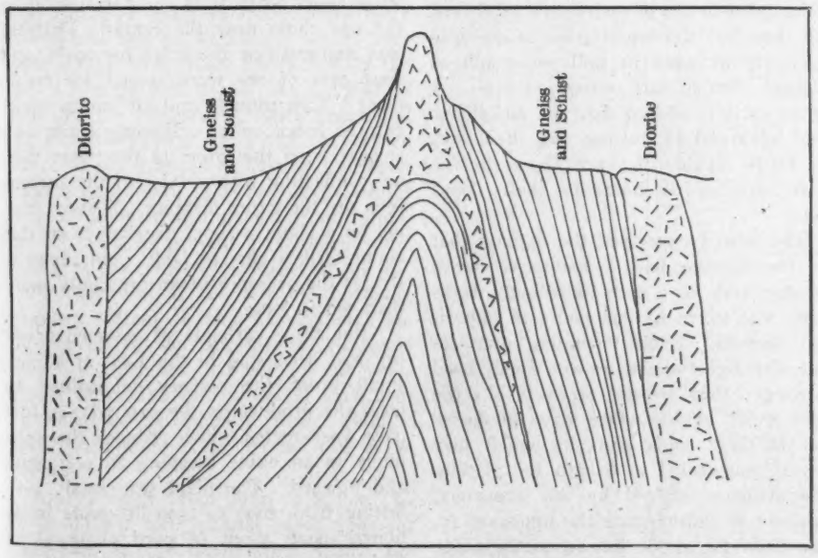
BY ROBERT N. BELL*

One of the most extensive and promising silver-lead prospects in the State of Idaho has recently been taken over by Wayne Darlington, former State engineer, on a working option for an Eastern syndicate. This is known as the South Mountain mine, and is situated near the extreme southwestern corner of Idaho, in Owyhee county, 25 miles southwest of Silver City.

The property consists of fifteen patented claims, and is owned by George A. Sonnemann, of Spokane, Washington, and is being developed by a force of 20 men at the present time. It bears a marked resemblance in geological structure, size, history, surroundings and mineralogical composition to the famous Broken Hill silver-lead zinc deposits of New South Wales. South mountain is an isolated uplift that rises to an extreme elevation of 8000 ft. in a broad plateau of Columbia basalt. It is about 10 miles long by 5 miles broad, and presents an anticlinal arch the crest of which has probably been broken by a fault and eroded to a deep gulch now forming the bed of Williams creek, which practically traverses the center of the uplift in a northwesterly direction.



CROSS SECTION, SOUTH MOUNTAIN LODE



IDEAL SECTION OF BROKEN HILL, N. S. W.

THE DEPOSIT

Parallel to the bed of Williams creek, and climbing over the highest crest of the mountain, near its source, there is a belt lode or zone of white marbleized limestone showing a blocky structure with black lines of silica and impurities and presenting the appearance of a much altered original sediment. Its general strike is northwest and southeast, turning sharply to the east, where it crosses under the highest crest of the mountain, near the head of the creek. It is from 100 to 300 ft. wide, and makes a distinct white line readily traceable for 10 miles. It has a dip to the southwest of about 60 deg., and is flanged on the hanging side by 1000 ft. of schist succeeded by a like width of gneiss, which in turn is succeeded by a wide belt of grano-diorite, and the same series on the footwall side. The schisted formations are doubtless an altered phase of the more massive grano-diorite. It is evident from the position of the limestone that it represents a sharply buckled fold or saddle-reef deposit and that other sedimentaries may be found in depth.

The Sonnemann property covers the choicest mineralized section of the limestone lode for two miles of its course, and consists of a combination of the best old claims that formed the basis of a big mining excitement from Nevada, in 1873, when the camp of South Mountain had a population for a short period of 1000 people, and in that respect differs from the Broken Hill schists, which are altered sediments. The rich lead-ore strike occurred associating with extensive brown gossan croppings, but wherever the lead carbonate ores were followed down to water level, which proved very near the surface, they changed to a massive mixture of marcasite, pyrrhotite, galena, zinc blend, and a sprinkling of copper sulphide, which proved too tough a metallurgical problem for the early-day operators. The boom rapidly subsided, and the camp remained idle for years until the principal old claims were gathered together by Mr. Sonnemann, six years ago.

AN INTERESTING MIXTURE OF MINERALS

The most important mineral feature of the property, as it stands today, is a continuous body of rich, spongy brown gossan ore and rotten vuggy quartz that is 10 ft. to 50 ft. wide, replacing the limestone near its hanging side for 2800 ft. in length. This great gossan has been opened by shallow shafts, cuts and tunnels at about 100-ft. intervals for its entire length which in every opening shows spots, irregular patches and streaks of copper lead and zinc carbonate ores. All the gossan carries appreciable values of gold and silver, and where associated with the other minerals, runs quite high in the precious values. Accompanying this great outcrop of iron and manganese gossan and included in it are great masses of sandy garnet rock, together with sparry crystals of actinolite, siderite and calcite. The mineral zone is cut at nearly right angles by half a dozen cross fissures that are invariably accompanied by small dikes of granite-porphyry. One of these cross fissures had an ore-shoot 150 ft. long and from 1 to 8 ft. wide, of comparatively clean lead carbonate ore, changing to a massive base mineral at the depth of 60 ft.

The remarkable variety of metamorphic minerals contained in the gossan also includes some barite, and a rare form of

*State inspector of mines, Boisé, Idaho.

iron ore called lievrite, which was recognized by Waldmar Lindgren. The main gossan strikes directly into the steepest part of the mountain and affords an excellent adit tunnel site, which will gain a face depth of 200 ft. on the orebody in a distance of 2000 ft. The gossan has been opened at the lowest point of its course at two places 600 ft. apart, and shows an equivalent body of the massive sulphide mixture, in which iron, zinc and lead sulphides are pretty intimately blended. The iron sulphides predominate, but there are streaks of very clean lead and zinc sulphides in the mass and where the galena is assayed separately, it invariably carries from 2 to 5 oz. of silver to each unit of lead. Specimen values are found occasionally in the clean lead and clean zinc minerals that run as high as $1000 per ton in gold.

It is a very refractory mixture of minerals, but with present methods of concentration it can unquestionably be separated into marketable products of lead, zinc and probably copper concentrates carrying high precious values. The proposition presents an enormous tonnage possibility. The district is 50 miles from the nearest railway point, but the intervening country is an easy one for railway construction.

FAMOUS NEIGHBORS

The veins of South mountain, like those of the Owyhee range, nearby, in which are situated the bonanza gold-silver deposits of Delamar and Silver City, are probably of early tertiary age. These rich silver-gold veins have been operated continuously for 40 years. They have produced fully $40,000,000.

In connection with the South mountain deposit and its variety of metamorphic crystals, the gangue of the Delamar veins presents a very interesting problem. The complex system of veins in this old bonanza is contained in an altered rhyolite formation above basalt and their gangue consists almost exclusively of pseudomorphic forms of barite, actinolite and calcite now pure silica, containing gold and silver milling values ranging from $10 to $60 per ton. It would seem that the original minerals, of which the crystal shells alone remain, may have originally been associated with lead and zinc values similar to those now found in the South mountain deposit, and that if the great mother lode of this property was developed through the volcanic cap down into the underlying formations which may prove to be sedimentary, that the original smelting metals that probably accompanied this sparry gangue may be developed in an enriched and concentrated form.

During the twelve months ending Dec. 31, 1906, 21,856 tons of mining machinery of British manufacture were exported from the United Kingdom, as compared with 27,854 tons in 1905 and 29,765 tons in 1904.

Duty on Nickel Anodes

District Judge Hazel, of the U. S. Circuit Court, southern district of New York, on Jan. 8, 1907, handed down a decision confirming the assessment of duty upon nickel anodes, cites the following reasons upon which his decision was based:

"The invoice in question, invoiced as rolled anodes, consists of plates of pure nickel about 12 in. long, 6½ in. wide and 7/16 in. thick, which are cut from sheets of nickel and chiefly used for suspension in a bath for nickel plating. They were assessed for duty under paragraph 193 of the present tariff act as a manufacture of nickel. The importers claim the classification should have been at 6c. per lb., under paragraph 185, reading as follows:

" 'Nickel, nickel oxide, alloy of any kind in which nickel is a component material of chief value, in pigs, ingots, bars or sheets, 6c. per lb.'

"The Board held that the nickel must be shown to be either 'pigs, ingots, bars or sheets,' and inasmuch as the facts of this case do not bring the importation within the evident language of paragraph 185, the collector's classification was correct. The importers contend that the words last quoted refer and are restrictive only as to forms of nickel alloys, as evidenced by the fact that nickel oxide, nickel cubes and nickel in grains cannot be included in any of such restricted forms, and therefore the importation in question is clearly included in said paragraph as 'nickel.' But in this contention I do not agree, as it is proven that the nickel has been advanced by cutting and the plates are made capable of practical use by the mere drilling of holes in their upper ends.

"The Board expressed the opinion that the merchandise had a distinctive name, purpose and use; and accordingly testimony was given in this court in opposition thereto. Such testimony indicates that, although the articles are chiefly used as anodes, they are not precisely like the commercial anodes which have hooks or ears at their upper ends by which they may be suspended in a bath for plating. The evidence offered by the importers, however, to differentiate the imported article from the anode known to the trade is unimportant, in view of the fact that the plates properly belong to a variety or class desired by some users, who prefer to drill holes in a plate or supply their own hanging device; and that given tending to show that the articles are commercially known as nickel sheets and not plates is unsatisfactory and inconclusive. Ordinarily a sheet of metal is comprehended to be broad, thin and expanded, while the dimensions of a plate are appreciably less.

"The decision of the Board of General Appraisers is affirmed."

The Antimony Belt in the Coeur d' Alenes

BY J. J. O'LEARY*

The orebodies of the antimony belt in the Cœur d'Alenes, are located on the Northern Pacific Railroad, about 15 miles from Thompson Falls, Mont., and about the same distance from Wallace, Ida., on the eastern border of the quartzite mineral bearing zone of these two States.

Antimony was first discovered in 1884 during the early rush to the Cœur d'Alenes, when all travel passed by way of Thompson Falls. There are several good prospects in the vicinity, but no work has been done except on six claims located in 1890. These properties are now lying idle owing to dissensions among the owners. The buildings and wagon bridges were destroyed by forest fire during the past summer, and also considerable timber in the immediate neighborhood.

It is only in these six claims that any knowledge of the orebodies has been gained. The ledges are blanketed with a pitch of about 15 deg. Assays show from 12 to 60 per cent. antimony; 8 to 30 oz., silver; and 90c. to $17 per ton, gold. The ores are free from lead and arsenic and carry a high percentage of sulphur.

Development has not been extensive. On one of the claims a tunnel cuts the ledge about 80 ft. from the portal striking the ore chute near the center. Drifting was continued on the ledge for 20 ft., and four cars of ore were stoped for treatment. Two tunnels and an incline shaft cut the ledge on an adjoining claim and a raise from the lower to the upper tunnel connecting with a raise to the surface is in ore the entire distance. A short tunnel on a claim a short distance from this claim strikes the orebody and demonstrates the presence of an ore chute more than 300 ft. long.

After three carloads of assorted crude ore had been sold in the East at a very small profit the owners determined to treat the product on the ground. A furnace was erected which reduced the antimony to an oxide assaying 80 per cent., and upward. The plant was small, producing from 1000 to 1500 lb. oxide in 24 hours, using about ¼ cord of wood as fuel. The oxide was collected in sheet-iron flues, and in two chambers situated about 200 ft. apart on the hillside. Three cars of the oxide were sold at a good profit before operations were suspended.

Three miles below the property several promising deposits carrying silver and lead, are being developed, the most promising being the Montana Standard. This company has been shipping silver-lead ore and is using power drills driven by a compressor operated by water power from Prospect creek.

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*Mining engineer, Wallace, Idaho.

The Mount Cogran Mining Company

This company, incorporated at Phoenix, Arizona, Jan. 15, 1906, has since procured license to do business in the Philippine islands. The stock of the company is principally held in the Philippines. The following report covers the period from Jan. 15 to Oct. 31, 1906, and deals with the installations of machinery, tests of ores and development of the company's mines.

The first instalment of machinery, a 10-stamp Union Iron Works mill, was received Apr. 1, and was set up and ready to begin crushing ore on June 10, from which time it has been running almost constantly. This plant has been used for testing ore to enable the company at an early date to install a large plant.

The first test, of 15 days, commencing June 11, during which 600 tons of run-of-mine ore was crushed, cost as follows, in pesos: Wages of American superintendent, 200; American foreman, 60; native mill men, 200; native car men, 45; native miners, 150; sundry expenses and supplies, 25; total, 680 pesos. The gold extracted from this 600 tons of ore had a value of 1500.36 pesos, showing a net profit of 920.36 pesos.

During the test, samples of plate tailings were taken every hour, and when the mill run was complete the samples were mixed and sent to Manila for assay; they were found to contain 8.26 pesos to the ton, a loss of 4956 pesos. As a result of this test the company at once negotiated for 10 more stamps and a 100-ton cyanide plant, which it hopes to have in operation some time in 1907. The test demonstrates that the company can make a profit milling its ore with its present plant, even while losing 75 per cent. of the values in the ore.

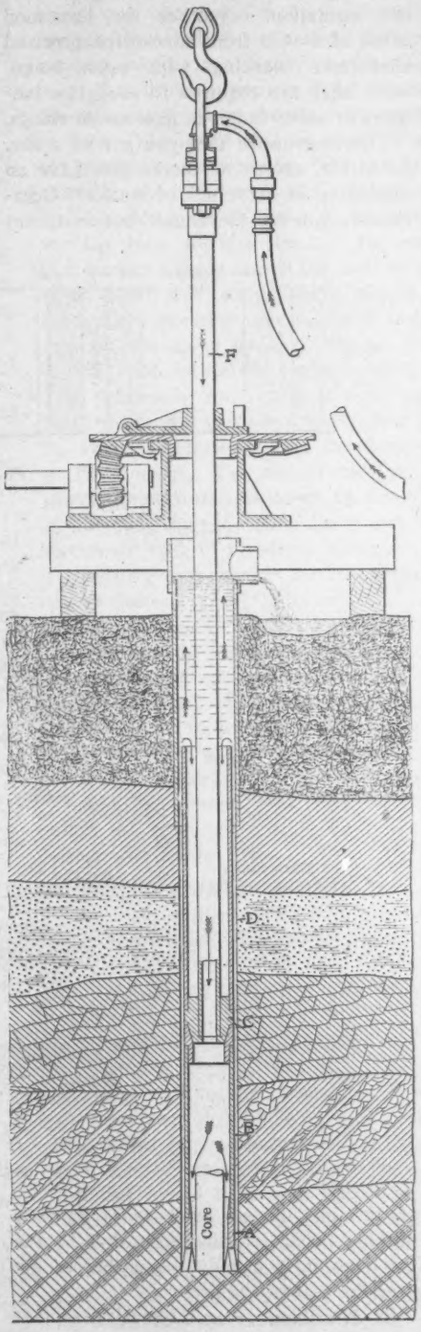
At the close of the test the company began a system of mine development, retaining all of the ore for future treatment by a process that will extract practically all of the values, except such ores as cannot be conveniently stored, which it will continue to treat in the mill as at present.

Assays range from $9.50 to $74.42 (U. S. gold) per ton, without much apparent reference to the depth from which the samples came. About 41,200 tons are blocked out in the richest paystreak, but the workings contain fully 120,000 tons of ore of sufficient value to pay to treat in a modern mill.

Mining and milling gold ores can be carried on in the Philippine islands for one-quarter of the cost in the United States; transportation to the Masbate fields is much more convenient than to many of the United States mining districts, and the Philippines contain abundance of the best mine timber in the world. Climatic conditions are also ideal for mining.

A Core Drill Without Diamonds

The Davis Calyx Diamondless Core Drill, described in a new catalog issued by the Ingersoll-Rand Company, is a prospecting drill producing cores from 1⅝ to 15 in. in diameter from any depth to 6900 ft. It does not use diamonds, but has never found a material which it could not cut at a paying rate. It gives a double record, depositing the cuttings successively as they occur and removing the core in convenient lengths. For ordinary materials a rotating toothed steel cutter is used, this having a chattering action instead of a smooth cut, and for the harder materials chilled-steel shot are used as an abrading material. The apparatus is built in different sizes, the smallest operated by hand and the largest requiring 20 or more horse-power, and capable of removing cores of large diameter from a great depth.



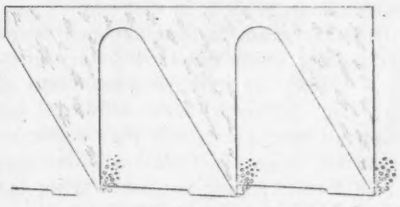
DAVIS CALYX DRILL IN POSITION

The Manufacture of Brass Wire*

BY E. J. BOLTON

The three principal operations in the manufacture of brass wire from copper and spelter are casting, rolling and drawing. The alloying of copper and spelter is usually performed in crucibles about 16 in. in depth and 10 in. in diameter at the top, tapering to about 9 in. in diameter at the bottom. These crucibles are generally heated in "wind furnaces," but gas furnaces, fired by producer gas or water gas, are also used. The wind furnaces are usually fired by coke.

Most of the grades of brass can only be rolled cold, and the oldest method in use is as follows: The metal is cast into long, narrow ingots of about 100 lb. each, and from 3 to 4 in. wide. The ingots are rolled between ordinary flat rolls until the desired thickness, depending upon the final gage of the required wire, is obtained. After the ingots have been rolled into strips they are split up into threads, afterward to be drawn into wire.



TEETH OF CALYX DRILL CUTTER

The process of drawing consists of pulling the strips by hand through a die until a length sufficient to reach to a wire block has been pulled through. The drawn wire is then wound around this wire block in a continuous coil. Power is applied to the wire block itself and the force required to draw the wire through the die must be transmitted entirely by the wire, and consequently the limit of reduction of one wire is reached when the force required to pull the wire through the die is nearly equal to the maximum tensile strength of the resulting wire. For drawing, steel dies are chiefly used, and are set to size by the wire drawer, with a punch of the correct diameter. For very fine sizes of wire, diamond dies are used. The holes in the diamond dies are drilled by means of hardened-steel drills, pressed lightly against the stone while the latter is revolved at a very high speed, and fed with oil and diamond dust. Wire as fine as 0.001 of an inch is obtained from dies made in this manner.

*Abstract of a paper read before the British Institution of Mechanical Engineers.

COAL MINE FIRES†

Precautions to be Observed, and Successful Methods of Attack

BY R. V. NORRIS*

Taking up the subject of mine fires, I might say that it is a normal condition to have a mine fire somewhere in the anthracite-mining region. In fact, we always have three or four on hand as a little side amusement, and a good many of them are very serious ones. As to the causes of mine fires, the principal cause is from the miner's open lamp; I believe that 95 per cent. of the fires could be traced to that cause. When the lamp is full it stands up very nicely and is perfectly safe; but when it is nearly empty the wick will tip over easily, bringing the flame in contact with the coal or wood.

CAUSES OF MINE FIRES

A great majority of fires occur in underground pump rooms; when the pump engineer is pretty sure that the boss is not around he takes a quiet little snooze, and sets his lamp on a board beside him. His snooze lasts longer than he expects, his lamp tips over, and soon he is making tracks as fast as he can to escape the fire that is brought about in that way.

Another cause is hanging open lamps on timber, which miners will very often do. A few fires start from explosions of gas, and although such accidents are likely to start a fire, still the number so occurring is small. Occasional fires also come from dumping hot ashes along the caved outcrop of a seam.

Some fires start from the miners leaving feeders of gas burning in their rooms when they quit work. In the working places in gaseous mines there will often be small feeders along the floor or the roof; these are sometimes lighted to burn out the gas and get rid of it, and then the men often go home and leave this gas burning.

Such a fire I saw in the "Pennsylvania" colliery some eight years ago. In the bottom seam the breasts went up about 220 ft. on perhaps a 60-deg. pitch, and were full of coal. The miners left a feeder burning in the face of the breast and the fire got down into the coal; a hose was pulled up the manway and the top was watered, without notable success. The burning coal was then hauled out, which cured the fire in short order. It took about 16 hours to load out the fire and send it up to the surface.

Another cause of fire is sparks from lamps or inside locomotives. The latter are now prohibited by law, but the use of those locomotives already installed is not forbidden. The same danger applies also to electric installation inside, and from sparking or through the breaking down of the insulation. Another very common cause of fires is from mine carpenters and timbermen working with open lamps, when they are required to use glass lanterns or safety lamps in gaseous workings.

The first notice that you get of a fire, as a rule, unless of course you have an explosion, is the smell of smoke. Occasionally you see the flames, but in 19 out of 20 mine fires no evidence of flame is visible. This is principally due to the fact that it is usually impossible to get near the seat of the fire.

In describing several typical fires that have come under my observation I do not say that they have all been bad fires, but each one does present points of interest from a technical view.

THE BIG LICK FIRE

The Big Lick colliery was opened about 1842, in the Lykens vein, in the extreme southwesterly end of the anthracite region; it is next to the last colliery there. The slope is about 1800 ft. long, on a pitch varying from 40 deg. at the top to 70 deg. at the bottom. On the 9th of December, 1901, there was a gang of carpenters working in the third lift, 900 ft. down the slope, each lift being 300 ft. They came up about 4 o'clock in the afternoon; about 7 o'clock the flames were noticed in the slope. There is no question but that they dropped sparks from their lamps when they pulled the bell wire to be hoisted.

The slope is one of the very oldest openings in the anthracite region; it had been originally opened 40 ft. wide, as a four-track hoistway. On one side there was a pillar of about 160 ft., and then, as the mining progressed, the slope was cribbed, leaving it about 10 ft. wide (Fig. 1). It was the worst conceivable place for a mine fire. Within 40 min. after the discovery of the fire the flames were leaping out from 50 to 100 ft. above the top.

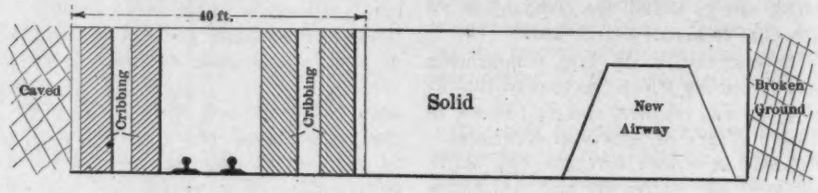


FIG. 1

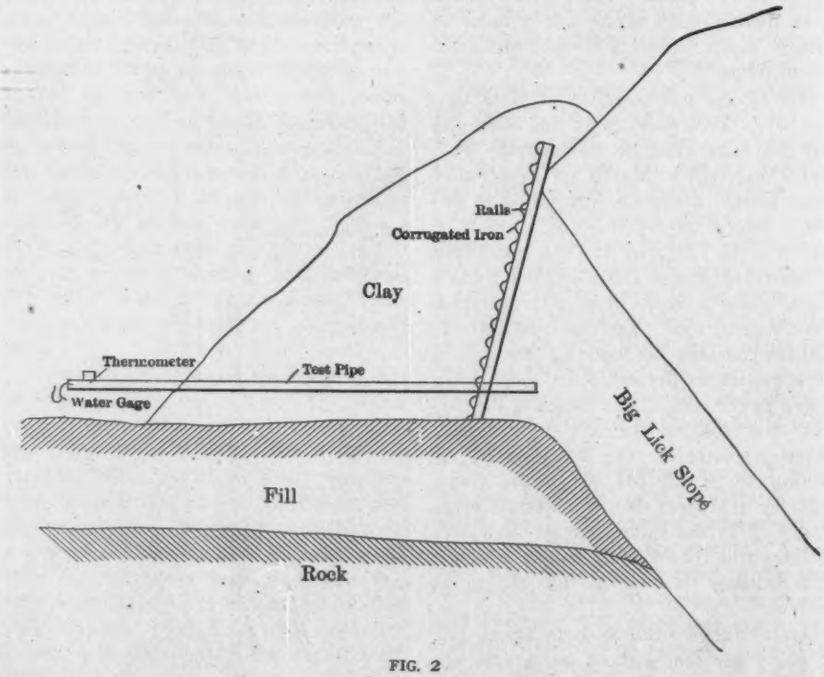


FIG. 2

There occurred a very exciting incident in connection with the start of the trouble. There were five men at the bottom of the slope when the fire broke out. They forgot that there was any other means of escape, being too frightened, I suppose, and the engineer, fearing there might be someone down there, let the car down to the bottom of the slope and left it there for about a minute, with the idea that anyone could get into it who might happen to

†A portion of a lecture delivered before the students at Columbia University, revised by the author, who has also made some additions to the original. The remaining portions will be published in a later issue.

*Consulting engineer, Wilkes-Barre, Penn.

be there, and could be brought up. When he pulled the car up through the fire, five unconscious men were taken out of it, and within 30 sec. from the time the car landed the slope caved.

The whole force of officials arrived at the colliery about noon on the 10th. At that time the flames were leaping up perhaps 60 ft. and the mouth of the slope was so hot we couuld not get near it. There had been efforts to attack the fire from the inside, which might have cost several valuable lives. On inspection by the officials the immediate decision was to close the slope as the only hope of conquering the fire. The gangways were about 10 miles long, connecting three other collieries, so that absolute sealing was impossible.

METHOD OF TREATMENT

The first trouble was to close the mouth of the slope; the hight was perhaps 20 ft., and everything was red hot. By using sheet-iron shields we were able to lay a series of railroad rails against the face of the slope (Fig. 2). Then we placed corrugated iron from the boiler house behind the rails and resting on them, which acted as a shield that we could work behind, even while it was red hot; and we piled clay against that.

The fire started on the 9th; by noon of the 11th we had the slope closed. In doing this a pipe was left protruding through the clay battery, with a view of taking temperatures and water gages, and of analyzing the gases, which last, I may say, we did not do, there being too many other things of importance to consider.

The following are some of the records of pressure and temperature taken during the fire:

Date.	Water-gage.	Temperature.
Dec. 13, 1901	0.96 in.	
Dec. 14, 1901	0.95 in.	150 deg.
Dec. 20, 1901	0.85 in.	150 deg.
Dec. 27, 1901	1.20 in. *a*	184 deg. *b*
Dec. 28, 1901	1.00 in.	194 deg.
Jan. 1, 1902	1.00 in.	224 deg.
Jan. 15, 1902	0 80 in.	260 deg.
Jan. 20, 1902	0.85 in.	332 deg. *c*
Jan. 22, 1902	0.80 in.	190 deg. *d*
Jan. 23, 1902	0.80 in.	182 deg.
Feb. 1, 1902		144 deg.
Feb. 15, 1902	0.60 in.	140 deg.
Mar. 1, 1902	0.50 in.	136 deg.
April 1, 1902	0.50 in.	110 deg.
May 1, 1902	0.40 in.	112 deg.
June 1, 1902	0.40 in.	114 deg.
July 4, 1902	0.40 in.	114 deg.
Feb. 3, 1903		100 deg.
Feb. 23, 1903		64 deg.

Commenced re-opening Feb. 23, 1903.
a. Maximum water-gage. *b.* Breach in stopping.
c. Maximum temperatue. *d.* Breach in stopping.

You will note that on Dec. 14 we had a temperature of 150 deg. in the air coming out through the pipes, and the water-gage was 0.95 in. The water-gage got up to 1.20 in., when there was a breach in the clay battery; this released the pressure. The increase in temperature that was shown immediately after this was probably caused by a starting up of the fire near the mouth of the slope, due to access of air through the breach. This heating only the top of the slope would account for the lack of increase in water-gage. On Dec. 20 there was another breach; the water-gage rose to 0.85 in. on account of this breach and the temperature ran up again to 132 deg. The flame started at the top, just where the fresh air reached. The slope was left closed until Feb. 23, 1903, when the temperature had dropped to 64 deg. F. coming out of the pipe.

REOPENING THE MINE

Then the idea of reopening was entertained and there was a very interesting method employed. In reopening the slope we had suction ventilation on the gangway; they drove a manway down through the pillar, parallel to the slope, to reopen in lifts. We found that so much of the old products of combustion that had been stored in the caved workings were drawn into the slope as to make it dangerous for the men working there. To avoid that we put a force fan on the head of the slope, which was run just hard enough to balance the pressure, keeping zero water-gage in the slope itself as far as practicable. On reopening, which work is now practically completed, it was found that the fire had extended down about 900 ft., and that the slope was caved almost to the bottom. The temperature at the lowest point was now about 85 deg., but by stopping the ventilation for a very few minutes it rose to 135 deg., showing what a very long time it takes for rocks to cool where there is no access of air.

There were a series of cave holes along the outcrop on both sides of the slope, where the surface had fallen in. These had to be closed off, and hydraulic mining was employed to accomplish this. A large pump was used and forced a heavy stream of water on the surface above the holes, bringing in gravel, sand and clay, and filled the openings for about a mile on either side of the fire.

A DANGEROUS EXPERIMENT

We had, incidentally, a very close call, early in the work. The mouth of the slope had originally been lower here by about 8 ft. This cut had been filled with refuse of various sorts, as indicated in Fig. 2, and the engine-house stood perhaps about 150 ft. from the slope on this fill. After we had been working for some time and were all tired out, the whole crowd went to rest in this engine-house, and if it had not been for the other shift coming in, I believe we would have been there yet; the gases worked through this filling, and the engine-house was so full of carbon monoxide that we all experienced the symptoms of the "cold gray dawn of the morning after" for several days.

OTHER METHODS OF FIGHTING FIRES

Another method of handling a fire is illustrated by the work done in the No. 6 tunnel of the Susquehanna Coal Company, at Glen Lyon, Penn., above water level. It was at the head of a plane, on the traveling way, and above it were broken workings. The fire was probably caused by sparks from the miners' lamps. When discovered, the roof had fallen and there was a mass of fire covering a considerable area. The timbers along the broken territory were blazing, there was no water, and apparently no chance to fight it if it got above the gangway. The workmen could, however, pass between the fire and the broken workings, so the first thing done was to bring in a lot of hand fire-extinguishers, and to use them on the outskirts of the flame. It was a very high seam, with long timbers, but with the extinguisher streams the tops of the timbers were reached, and the flames extinguished. A bucket line was then formed up this plane, and water was hauled in barrels; pails were passed from hand to hand up the incline in spite of the fact that the entry was on the wrong side of the fire, and the products of combustion made the air very bad.

A line of about 100 laborers and miners was employed passing buckets; as soon as a man worked at the head of the line for five minutes, he was sent down to the lower end, where the air was good; there he was allowed five minutes' rest, and then, starting in at the bottom, worked up to the head of the line again. We had the men passing water for several hours, and by that time the fire was surrounded and held fairly well on the outside.

Then came the problem of getting in to the burning coal; the roof had fallen, and the fire was under it, and we were up against the problem of removing these enormous pieces of slate; they were drilled and blasted, as they lay on top of a blazing furnace, and it was not by any means a joyous job to load those holes. In the course of some 14 or 15 hours the fire was out and the fallen roof cleaned up and carried away.

TREATMENT BY FLOODING

Fires below water level can always be treated by flooding, and it is frequently the only way to deal with them; however, you are always up against the question of how much water to put in. There is a very simple way of calculating this if your workings have to be flooded. You usually have records of the output of the mine, and considering that it takes about a cubic yard of water to replace a ton of coal, you can usually get at the approximate amount of water required for flooding.

In flooding a colliery you have to find some means of getting a large water supply. Perhaps the most prominent case of flooding in my experience was the Cameron colliery, at Shamokin, Pennsylvania, where about two billion gallons of water from Shamokin creek were sent in. Shamokin creek is a stream perhaps 30 ft. wide, and by blasting around the manway, in three or four days we were able to turn the entire stream into the colliery. In the flooding of that mine, there was a very interesting problem; the fire was in the Baltimore seams Nos. 8 and 9. These were connected with other workings only by an inside shaft, but the top of this in-

side shaft was below water level. We did not want to flood all the workings, only the upper seams, and I. A. Stearns, then general manager, suggested the idea of putting a dam in this shaft. A dome-shaped dam was consequently built, and it held successfully under water pressure. Some difficulty was experienced in fitting in the keystone from underneath, as no one cared to close himself permanently in the shaft.

The flooding was carried to the level of the creek, leaving all the lower seams open; their only connection was up the shaft, and the dam saved thousands of dollars, because, while flooding is a very sure and simple way of putting out a fire, it is hard to clean the mines up afterward; the water causes the roof to fall, and you have to reopen through broken territory almost all the traveling ways of your mine.

A very nasty fire occurred in 1902 in the Cameron colliery, due to the tipping over of an ordinary miners' lamp. The fire started in the pump room and soon extended to three breasts, about 100 ft. along the gangway, and about 300 ft. high. It was one of the very few serious fires in my experience, that have been successfully fought back, with hose and an exercise of grim perseverance.

The work was taken charge of by the superintendents, and they fought it back inch by inch. First they got around it, and cut it off, so that it could not readily extend, and then they fought their way through it, and worked for over a month before it was entirely extinguished.

IMPORTANT PRECAUTIONS

In fighting a fire, it is always advisable to be on the intake-air side; you are then in the fresh air; on the return airways, the gases are something appalling, and the worst danger of carbon monoxide is that you go over suddenly. You feel all right until your knees give out, and then you fall unable to move, making it likely you will die where you drop, unless assistance comes promptly.

In all collieries it is advisable to have the fan arranged so that it can be reversed, because in many instances you can thus turn the air current so as to make the fire burn back over its track. It is then possible to come up to the fire with the knowledge that it has got to burn back over its former course, and will find comparatively little to feed on.

Another celebrated fire, that at Nanticoke, Pennsylvania, which was before my time (back in the late seventies) was fought by extending a sheet-iron tube up to the fire itself, carrying the ventilation in it, and eventually putting the fire out with water.

Zinc ore is now produced in northwestern Rhodesia. The shipments of calcined calamine in the last three months of 1906 amounted to 5512 tons.

The Action of Coal-mine Gases

BY RICHARD LEE.

The principal gases met with in coal mines are carbon dioxide, carbon monoxide, carbureted hydrogen and after-damp. Carbon dioxide is formed principally by the combustion of illuminants, by the respiration of men and horses, and by the rotting of mine timbers. This gas is considerably heavier than air and tends to occupy the lowest part of the mine. It has a peculiar odor and taste but no color, and its presence is generally manifested by its influence on the flame of a candle, as it will not support combustion.

Experiments have shown that 15 per cent. of carbon dioxide with air will extinguish the flame of a candle. It has also been proved that respiration may be maintained in a mixture containing 25 per cent. of CO_2; this fact, however, should not encourage anyone to remain in an atmosphere that will not support combustion, for after the light goes out there is no way to determine whether 15 per cent. or 50 per cent. of carbon dioxide is present.

When 50 per cent. of this gas is present, the breathing is accompanied with considerable distress. If 60 per cent. is present, the individual loses power over the limbs. This is also accompanied by confusion of the mind, and the appearance of a heavy haze before the eyes, which is undoubtedly due to an insufficient percentage of oxygen to saturate the blood as it passes through the lungs. If fresh air or oxygen is now supplied the victim, the recovery is almost instantaneous, and no after effects are experienced from breathing the black damp.

CARBON MONOXIDE

Carbon monoxide gas, generally known as white-damp, is not of such frequent occurrence in mines as black-damp. It is so poisonous that less than 0.5 per cent. will produce giddiness; when it is present in a quantity exceeding 1 per cent., the result is generally fatal.

It has been found that 0.06 per cent. of white-damp will visibly affect a mouse. This gas is generally known by its sweet odor and deadly results. Candles burn well when it is present, if anything the flame is brighter; when 13 or 14 per cent. of the gas is present the flame is usually elongated.

When this gas saturates the blood to the extent of 50 per cent., the individual loses all power over the limbs, so that it is almost impossible for him to escape. When the saturation of the blood reaches 80 per cent. consciousness is lost with no pain and little mental distress, and the victim passes away just as if a gentle anesthetic had been administered.

FIRE-DAMP

Light carbureted hydrogen, known as fire-damp, is the gas most commonly found in coal mines, and it is to this gas that explosions are principally due. Fire-damp is a mixture of several gases, and principally issues from the coal itself, where it is generally held in the pores or cells in a state of high tension.

It is disputed whether fire-damp can be detected by its smell. One thing, however, is true, that the greater the percentage of carbureted hydrogen contained in the gas, the harder it is to detect it by any odor. The gas if breathed for a considerable length of time would soon cause death; it quickly extinguishes the flame of a lamp if undiluted by air, but when found as it usually is in mine air, it can easily be detected by the elongation of the flame in a safety lamp. Experiments show that 7 per cent. of this gas is explosive, and that when about 12 per cent. is present, the explosion attains its maximum force; when 20 per cent. of the gas is present it is no longer explosive and will instantly extinguish the flame of any lamp.

AFTER-DAMP

After-damp is the product that results from the ignition and explosion of fire-damp and other mine gases. When 1 cu. ft. of fire-damp is burned there are 40 cu. ft. of air rendered unfit for respiration. After-damp is the most dangerous gas with which the miners come in contact, and it is now generally known that the majority of those killed in explosions, have died from the effects of the after-damp which suffocated them.

Dr. Haldane, who made careful investigations at three different explosions, found that from 60 to 70 per cent. of the bodies were neither burned nor injured, and that about 77 per cent. might have escaped but for the effect of the after-damp.

Carbon monoxide, one of the deadly constituents of after-damp, cannot be detected by the safety lamp, as its action on the flame is almost unnoticeable. A mouse shows symptoms of poisoning from carbon monoxide 20 times quicker than a man, so that the little animal can often be used to detect a dangerous atmosphere. In a test of this sort it should be remembered that after-damp is lighter than air, so that the mouse must be kept as high above the head as possible.

When a miner has been rendered unconscious from the effect of after-damp, the best remedy is the prompt administration of pure oxygen, although this treatment is of no avail against the later symptoms which may occur long after the man has been removed from the mine. If breathing ceases, artificial respiration should be at once applied, and some authorities advise the use of weak stimulants to increase the heart action; this latter treatment is disputed, however, because of the shock the individual has already endured.

THE RICHMOND COAL BASIN

Youngest Coal the Earliest Developed—Sinking With Air-Hammer Drills

BY EDWARD K. JUDD

From the James river, a few miles west of Richmond, Va., an oval area of Triassic sedimentaries stretches southward for 33 miles with an average width of 9½ miles. The lower members of this series, which have been assigned to the Newark formation, carry a group of coal seams, usually three in number. The base of the group is a coarse conglomerate, and the most prominent rock above the coal is a sandstone of varying texture, often approaching the character of a conglomerate. It carries grains of glassy quartz, up to ½ in. diameter, and a large proportion of feldspar and mica fragments, for which reasons it appears to have been derived, at no great distance, from a granite land mass.

The region has been subjected to strong dislocations and a large amount of volcanic activity, although the igneous rocks resemble intrusions rather than surface flows. In many places diabase dikes have intruded along the bedding and, if in proximity to a coal seam, have driven off the volatile components of the latter, leaving a natural coke; this material is mined at several points. It is noteworthy that no trace of these volatile oils and gases can be found in the adjoining rock strata, although these seem admirably suited to absorb and retain them.

The western edge of the basin is defined by a nearly vertical fault which cuts off the coal deep below the surface. The coal outcrops on the eastern side, however, and here a thrust fault of low pitch has brought the underlying granite up into close proximity to the coal seams. It is often stated in the literature on this district that the coal is found actually resting on a granite floor; this phenomenon is certainly of rare occurrence and no opportunity is now available for observing it. In all the mine openings now approachable, the coal is nowhere found without its underlying bed of fireclay.

The Richmond coal is interesting because, with two comparatively insignificant exposures in North Carolina and Georgia, it is the only Triassic coal east of the Mississippi; in spite of its contemporaneity with the low-grade Triassic lignites of the West, it appears to be inferior in no essential respect to the Carboniferous coals of the East. It has more than local importance from the fact that, if we except the graphitic anthracite of Rhode Island, it is the only coal in the United States in immediate reach or even in the proximity of Atlantic tide-water.

It was here that the first coal was mined on the American continent. The easily accessible eastern outcrop of the coal soon attracted the attention of the Virginia settlers and it is a matter of reliable record that, as early as 1701, coal was being regularly consumed in this vicinity. In the days of slavery, each plantation with a coal outcrop within its boundaries supplied itself with this fuel. The outcrop line is still thickly dotted with caved pits and slopes dating from this period.

At the close of the war, organized attempts were made to develop the coal systematically. An important one of these took place at Midlothian, 12 miles south-

SHAFT-HOUSE AT JAMES RIVER COAL CORPORATION'S MIDLOTHIAN MINE

west of Richmond. Here a shaft 600 ft. deep was sunk inside the outcrop and a certain amount of indiscriminate drifting and slope sinking was accomplished with a noble disregard for the rules of the art. A fault which cut off the seam terminated activities at this mine, and it has been idle for 30 years.

The James River Coal Corporation, of Richmond, has secured this and adjacent tracts and, under the management of Meriwether Jones, is reopening the coal in a workmanlike manner. The old workings will be abandoned, except one which falls in with the present system, and a few others which may provide return airways. The old shaft, with its hoist, is now utilized for lifting water. Each of the two cages, which are in balance, consists of a wooden box, of 30 cu.ft. capacity, provided with a valve at the bottom of one side. Track is laid over the top of the box so that a loaded car can be hoisted at the same time, if desired. The water is discharged automatically at the surface.

The new work thus far completed consists of a rock slope which has met the coal and connected with the most promising of the old workings. The most interesting feature of this slope is the use of air-hammers for doing all the drilling at the face. The rock is the coarse sandstone above described, which, though its components are hard enough, is not strongly coherent, breaks readily, and upon exposure to the weather, crumbles away to sand. The slope agrees closely with the pitch of the strata. The following observations must therefore be interpreted with strict reference to this peculiar nature of the rock, and to the fact that negro labor alone is available, although the latter seems unusually efficient.

Leyner and Rand drills were both tried, mounted on bars and tripods, without satisfaction, the main objections being that they were cumbersome to handle, and that the time spent in setting up, and in moving them out of the way for a blast, was too large in proportion to the time occupied in drilling holes. It was difficult also to maintain the dimensions of the slope. The Jap hammer drill, though easily wielded, was too slow in drilling and too complex in mechanism. The hand drill made by the Hardsocg Wonder Drill Company, of Ottumwa, Iowa, was then tried, and has since been the only tool employed. This is simple in the extreme, having but one moving part, and this is merely a partially hollow steel plunger, 17/16 in. diameter, 6 in. long, somewhat hardened and more solid at the striking end. The hammer is easily handled by one man, and strikes about 600 blows per minute.

The bits used with this hammer are made of 1-in. hexagon, hollow drilled steel; a set comprises 1-, 2-, 3-, and 4-ft.

bits, the cutting end of the starter being 1 7/16 in. diameter, and of the finisher, 1¼ in. The cutter is in the form of a six-pointed star. Before dressing the cutter, the blacksmith drives a steel pin into the center hole to preserve its shape and size, and the swage for forming the edges and incisions of the cutting face also has a central projection for the same purpose. The cutting faces on the bits as they come from the factory have rather a deep depression between points, which is found to be less suitable for this rock than a more shallow one, and the bits are dressed accordingly. A graduated gage is used to preserve the "follow" of the bits.

The slope in which they work is 7 ft. high, 17½ ft. wide at the bottom and 14½ ft. wide at the top, and pitches 33 deg., which is also the average dip of the strata. Three shifts of six men each are at work. Three men in the slope handle as many drills, with the assistance of a fourth, and two men at surface dump the loaded cars. A round consists of three horizontal rows of eight to ten 4-ft. holes, the bottom row pitching steeply to break out a drag cut. This row is fired first, and the remaining holes then break to size. It is a common feat to drill a 4-ft. hole in five minutes, with 90 to 100 lb. pressure, and the miners have a saying that it takes less time to drill a hole than to load and tamp it. The rounds are fired by electricity and then the drillers clear out the broken rock. The average advance since these air hammers have been employed has been 60 to 65 and 70 ft. per month, not working on Sunday. In one month, 73 ft. was gained. The slope was begun March 4, 1905, and broke into its intended connection on Oct. 7, 1906, a total distance of 1012 ft. in 19 months. In places, a good deal of timbering was required, and here the advance was slower, so that the average of 53⅓ ft. per month, in view of all the circumstances, is highly creditable.

The Coal Industry in Indiana

SPECIAL CORRESPONDENCE

Considering the fact that the past year has been filled with trouble, and that the coal industry got a bad start, the production has been equal to expectation, falling a little below that of the previous year. Anticipating a strike April 1, the operators worked their mines to full capacity during February and March, and then there was a general cessation until June 10. Following this there were local strikes, scarcity of water and lack of cars, which occasioned from two to three days' idleness each week. The price of coal has been fairly satisfactory, but this availed little while the operators were unable to get the coal into the market. The principal contentions during the year were over minor matters, such as removing slate, shot firing and transportation to and from the mines.

The year will pass into history as the first instance when the joint convention of miners and operators failed to agree upon a wage scale, and the subsequent failure upon the part of the operators to stand together for the old scale. However, the result of these peculiar events had little to do with the volume of production, the most serious handicap to a large tonnage was due to car shortage.

The prospects for next year are very good, and if present prices prevail throughout the year there need be little fear but that the coal industry in this State will yield a good profit. The operators take great hope that the legislature will pass measures calculated to afford the desired relief from unjust car demurrage and more prompt shipment of consignments.

The mine workers are asking for a law to prevent the employment of incompetent men as miners. A bill has been prepared which provides for examinations of all who seek employment, and in many respects modeled after the Pennsylvania law. The bill provides for a commission of three miners, to be appointed by the Circuit Judge, whose salaries are to be paid by a fee of $1 from each applicant for a license. The applicant will be required to have had two years' experience as a mine laborer. It is understood that the operators will not oppose the bill, since the matter is largely within the province of the mine workers, and if they assume the responsibility to provide competent licensed men, the mine owners may escape the responsibility of their negligent acts.

The miners are still refusing to return to work in the Rosebud mine, where the serious explosion occurred. The conditions that the company insists upon, and to which the miners object, is that shot-firers shall examine all shots before they are set off, and if an illegal shot is found, the shot-firer shall make a report of it, including the name of the miner who put in the shot. The company also insists that when the miners return to work they shall fire their own shots on the first day. The miners profess to see in these restrictions the hand of the liability company which carries insurance in the mine, and recognize in it an effort to get evidence for the defense in the damage suits which will be brought by the victims of the Rosebud explosion against the Vandalia Coal Company and the liability company. The 30 injured miners have retained legal counsel in order to sue for damages.

There is a bitter contention between the miners on the one hand and the mine inspector and the company on the other hand as to whether it was a dust or a smoke explosion. The miners are greatly displeased with Inspector Epperson for deciding that it was a smoke explosion and will, they say, endeavor to prevent his reappointment.

There is considerable interest manifested in the proposed investigation of the coal-producing industry of Indiana by the Interstate Commerce Commission in February next. The commission proposes to direct its attention to the coal mines of the State with a view of ascertaining just how closely identified some of the mining companies are with railroads of the State. A point to be determined is whether stock in any of the Indiana coal mines is owned by railroad companies, and to what extent that ownership cripples the marketing facilities of competing mines.

The Indiana Railroad Commission has suspected for some time that the management of the Southern Indiana Railroad is heavily interested in coal mines in southern Indiana, and this fact accounts for the alleged discrimination in favor of these mines in the supply of cars to move the coal.

Careful and scientific tests are being made at the Indiana Penitentiary, at Jeffersonville, with a view of deciding, if possible, the relative standard of merit, as far as the uses of that and similar State institutions are concerned, between Pittsburg river and Indiana coal. The two coals are now being used in competition—the former at $1.97 and the latter at $1.45 a ton.

It is asserted by the advocates of the Pittsburg coal that the difference in price is more than counterbalanced by the superiority of the coal. The Indiana coal men dispute this, and a thorough test of the question is being made, with a careful record of results obtained with each class of coal. The State hopes to base future contracts for coal on the basis of the relative values ascertained by the tests.

Safety Devices

The first international exposition of safety devices is being held in the American Museum of National History, New York City, under the auspices of the American Institute of Social Service. The object of the exhibition is to promote social and industrial betterment by means of a museum of safety appliances.

The devices for reducing the possibility of accident, which are shown by their makers, include various kinds of safety-valves, car-couplings, fire extinguishers, emery-wheel protectors, engine-stop devices, window guards, non-explosive oil-cans, etc. Safety appliances directly applicable to the mining or metallurgical industries are conspicuous by their absence. One elevator or mine-cage safety-catch is shown and there are a few devices which might be used at a mine or smelter, but nearly all are more directly applicable to other industries. No miners' safety-lamp is on exhibition, with the exception of a portable electric lamp which the makers claim may be used in underground work.

COLLIERY NOTES

Details in the Operation and Development of Anthracite and Bituminous Mines

In ventilating an underground mine stable, it is generally advisable to have the return current from the stable pass through a regulator, so as to prevent any drafts that might injure the overhead mules brought in from work.

In arranging the drives from a line of shafting, it should be remembered that if the pulleys or sprockets are distributed equally along its length, and the power applied in the middle, the strength of the shaft need only be half as great as would be required if the application of the power were at one end.

Where a mine has two hoisting shafts, one for rock and timber, and one for coal, the underground arrangement of the tracks, etc., at the bottom, should be so planned that in case of injury to the main hoist the cars loaded with coal can be promptly switched to the other shaft and the hoisting continued without delay.

Great pressure on a coal seam, due to the heavy overlying strata, may be the cause of a serious mine fire. Such a result is more likely to occur when the coal bed is deep, and when the pillars are being robbed on the retreat. The pressure first breaks the coal, and then grinds it to a powder, which action is accompanied by considerable heat.

The idea seems to prevail that oak props will support a greater load than most any other kind of timber; this is not the case, for experiment has shown that black or yellow locust props will resist a greater crushing load than any other wood. Following locust, in their degree of strength, may be mentioned, Georgia pine, black or sugar maple, hickory and birch.

It is especially important in ventilating an inclined seam, to see that the intake air, which is generally cooler than the return, is conducted at once to the lowest portion of the workings, from which point it gradually absorbs heat and tends to ascend to the higher workings. This system creates a motive column which naturally assists the entire ventilation of the mine.

The principal result obtained in splitting an air-current is a reduction in the velocity of the air with the same pressure, and a consequent saving in power. The practical limit to splitting the air is readily determined by remembering that the velocity of the current must not fall below 200 ft. per min. in non-gaseous, and 300 ft. per min. in workings where gas is found. It is necessary therefore to always calculate first and see if the velocity of the air-current is far enough above the limit to permit a reduction by splitting.

Where a mine fire has occurred and the affected portions of the mine have been sealed up, much care must be exercised in again opening the workings. In performing this work, the return dam should be opened first. It is advisable to drill only a small hole through the stopping and then to insert a pipe having a spigot, or cap, attached. This arrangement will permit testing the air in the sealed workings; and if much gas is present behind the dam, it can be drawn off gradually into the return. It is also possible in this manner to tap and let off any water that is accumulated behind the stopping.

In a mine where the coal has both face and butt cleavage, the superintendent often determines his methods of working solely from the fact that the coal is easier to mine by driving either to the face or butt. Under such conditions, when the cleats in the coal are good, it is sometimes best to drive the entries and room at an angle of 45 deg. to the main line of cleavage. This method is often made more advisable from the fact that the joints in the roof frequently coincide with the cleats in the coal, and if the places are then driven to the face or butt, the roof is made dangerous, and much expense is incurred in timbering and cleaning up falls.

In an underground mine stable it has generally been advocated that the heavy plank floor for the stalls should be nailed to sills which are sufficiently raised to allow a space of 2 or 3 in. for the air to circulate between the concrete bottom and the planking. This practice is now abandoned at many mines; the concrete bottom is carefully graded, and the planking is laid flat on the floor. The reason for this action is based on the fact that some of the mules, constantly paw the floor until the planks are worn through, and if there is an open space under the wooden floor the mules' hoofs are liable to get caught, and an injury result. Further investigation also shows that the planks used for a bottom swell and the cracks become tight, so that no water leaks through and causes the timber to rot, nor is the stall more unsanitary.

In a mine where considerable timbering is necessary, and many props are used to support the roof, it is found advisable to taper the bottom end of a prop before setting. The pointed end of the prop is then set in a hole cut in the floor. The advantage of this method lies in the fact that the weakest point of the prop is near the floor, and consequently, when the weight of the roof comes on, the point of the prop crushes or spreads, instead of the timber breaking in the center. The prop can now be removed, and after cutting off the bottom, can be re-pointed and used where the seam is lower. It is well to remember, however, that tapered props cannot be used satisfactorily when the bottom is soft, since the pointed end instead of crushing, only sinks further into the strata. The one disadvantage of tapered props results from the difficulty experienced in withdrawing the timber.

At many anthracite mines, it is the practice to whitewash the stables and the sides and roof of all entries near the foot of the shaft. This not only looks better and is sanitary, but has the further advantage of lessening the imediate danger from dust. In this whitewashing, two men are employed; a tub full of whitewash is provided, and one man operates a hand air-compressor, keeping the pressure at about 100 lb., as shown by a dial indicator attached to the compressor. A suction pipe, with a screened end, draws the whitewash from the tub, while the other man holds the nozzle of a long pipe and sprays the sides and top of the entry. The arrangement is portable and can be carried by the two men. In outside work for painting fences, etc., a pressure of 175 lb. is used, as paint is thicker, and requires more pressure behind it than whitewash. Steam can be used instead of compressed air, but does not act as satisfactorily.

It is necessary to perform only rough experiments in order to show how important it is to properly lubricate surfaces that move in contact, and thus effect a material saving in the power expended. The coefficient of friction may be expressed either in pounds per ton, or as a decimal. A 200-lb. block, having a dry, plane surface, rested on another larger and stationary block, and in order to slide the former, it required 80 lb. pressure, the coefficient of friction in this case was then, 80/200 or 0.40. It has been proved in experiments of this kind, that when the surfaces of the two blocks are perfectly lubricated, the coefficient of friction is reduced to about 0.08. In a similar manner, the friction coefficient of wrought iron on wood, is reduced from 0.60 when dry to 0.09 when lubricated; also the friction of steel on cast iron, which is 0.20 when dry, is reduced one-half by lubrication. These figures go to prove how necessary to economy is proper lubrication of friction bearings in machinery and rolling stock.

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Inquiries as to Mines

We receive many inquiries as to mines and mining companies. In most cases, where the inquiries relate to investments, we urge always that information be sought from a mining engineer resident in the district. The professional directory published in the advertising pages of the JOURNAL gives names and addresses of many reliable engineers in all parts of North America who will for a fee commensurate with the service desired be glad to reply to reasonable inquiries.

Our function is to publish the news, and all that we are able to communicate is given in our columns. The mining news is classified in such a way that what is looked for may readily be found. Many who are not regular readers of the JOURNAL would find that, if they should subscribe and become regular readers, the information desired is to be found in its columns. If it should happen to be otherwise, as a further aid we will request our correspondents to communicate the latest available news as to any property inquired about, provided the inquiry states its location.

This is the most we can do. We cannot enter into any correspondence as to such inquiries, because the number is too large, and we cannot make searches through our back files, because the time required is too great. We do not spare efforts to provide the news and we urge all who desire such information to obtain it by a careful reading of the paper. Such a reading, to be valuable, should be continuous. We are frequently requested by inquirers to send a marked copy, or otherwise notify them, when something about a particular mine is published. We cannot agree to do it. They must read the paper.

The Statistical Work of the Geological Survey

With the publication of the "Mineral Resources of the United States" for 1905, which will shortly be ready, the Geological Survey will abandon a long practice in its statistical work in favor of a new plan. During the last 31 years the industrial and statistical reports incorporated in the "Mineral Resources" have been largely prepared by a corps of outside experts. Hereafter these reports will be made by members of the Survey proper. We do not venture to predict how the new departure will work out. There is much to be said in favor of each system. It will be admitted that the expert ought to be a more competent statistician in his particular line than the non-expert can ever hope to be. On the other hand, it may happen that the expert may perform his work in the perfunctory and unsatisfactory way that has many times led us to criticize the results of the Division of Mineral Statistics.

It is possible, indeed is to be expected, that the members of the staff of the Geological Survey will make themselves experts in the particular branches to which they are assigned. The excellent work of E. W. Parker, of the Survey, in collecting the statistics of the great coal industry has for several years been a prominent feature of the "Mineral Resources," and more recently the grand work of Mr. Lindgren on the gold and silver statistics is an excellent example of what may be done in this direction. If their standards are maintained in the other branches, the new departure of the Survey will be a success. However, it is questionable to what extent the geologists of the Survey may be employed in statistical work without detracting from their geological work. It would be a pity to see a system develop which would require a geologist like Mr. Lindgren to devote a large portion of his time merely to the collection of statistics.

The Federal and State Geological Surveys

One of the questions which will immediately come before the new director of the Geological Survey will be the relation between the Federal Survey and those of the various States, and the formulation of plans for harmonious work. Dissatisfaction as to the conditions which have existed for many years has recently excited a vigorous discussion. Dr. Walcott, the retiring director, was prompt to recognize, when the matter came to a head, that an improved policy could advantageously be adopted, and at his invitation a conference of State geologists was held at New York during the recent meeting of the Geological Society. The exchange of views that occurred then will be of general advantage and doubtless will lead to some plan for coöperation.

We have urged repeatedly that much of the work that has been undertaken by the

Federal Survey ought properly to have been left to the State surveys. It is proper that the Federal Survey engage itself in general geological problems, in the study of the mineral resources of the Territories, and in all matters which pertain to the national land. The development of the mineral resources of the States, where the nation has no direct interest, should be left to the States themselves, but the instances are many where the Federal Survey has carried on extensive work in States where there is no national land, and in some cases in more or less conflict with the State surveys.

It is gratifying to be able to believe that such unfortunate conditions are unlikely to continue to exist, as certainly they will not if conferences among the State geologists and the director of the United States Geological Survey are held according to the present plan, and a suitable working agreement be determined upon. It is the duty of every State which has mineral resources to provide a geological survey for their study and to lend assistance in their development. This has long been recognized by many of the States which have maintained geological organizations of high efficiency and correspondingly satisfactory results. Movements are now on foot to create geological surveys in Arkansas, Colorado and Wisconsin. This illustrates the increasing interest in the mineral resources of those States, and the recognition that the scientific work for the promotion of their development is something that the State itself ought to attend to. That view is correct. It is to be hoped that the States of Arkansas, Colorado and Wisconsin will provide sufficient appropriations not only to create geological surveys, but also to have thoroughly good ones, and having once inaugurated the work will see that it be carried on indefinitely. In modern practice, every big mining syndicate has found it necessary to employ a geologist. Certainly every State ought to have a corps of geologists, organized as a geological survey.

Copper Production in 1905

Considerable misunderstanding has resulted from the difference between our statistics of copper production in 1905 and those reported by Mr. Kirchhoff for the Geological Survey, which are adopted as the official statistics of the latter. Our report was 871,634,245 lb., which was the total of the reports made to us by all the producers in the United States, except in California, outside of Shasta county, for which we estimated the output, this being comparatively unimportant. Mr. Kirchhoff reported 901,907,843 lb.

Differences in statistical compilations do not necessarily imply inaccuracy on the part of the statisticians. They may be due, to some degree, to differences in the methods of compilation. However, in the case of the copper statistics, we believe that our method and that of the Geological Survey are substantially the same.

The difference between our statistics and those of Mr. Kirchhoff is partly in Michigan copper and partly in Western copper. As to the former, we believe that there can be no question as to who is correct. The Michigan commissioner of mineral statistics, to whom the companies make sworn statements, gives the production in 1905 as 217,762,382 lb., which is a little more than a million pounds less than we reported. As a check on the Western production, we now have the report of Waldemar Lindgren, of the Geological Survey, who in one of the most elaborate statistical investigations ever undertaken by the Survey reports the production of lead and copper in the Western States, together with the production of gold and silver. The three sets of statistics are summarized in the following table, in which for the purpose of comparison we have added to Mr. Lindgren's figures the report of Mr. Kirchhoff for the output in the Southern States and our own report for the output in Michigan.

State.	JOURNAL.	Kirchhoff.	Lindgren
Alaska	4,703,600	4,900,866	4,805,238
Arizona	222,866,024	235,908,150	228,418,679
California	a 13,089,993	16,697,489	16,697,544
Colorado	9,854,176	9,404,830	9,404,830
Idaho	6,500,000	7,321,585	7,321,585
Montana	319,179,885	314,750,582	304,723,526
New Mexico	5 638,842	5,334,192	6,126,025
Utah	51,950,789	58,153 393	57,298,054
Wyoming	2,393,201	2,530,531	2,394,008
Other States	1,550,000	1,483,273	1,368,797
Western	637,726,510	656,484,891	c 638,558,286
Southern	14,907,982	15,134.960	d 15,134,960
Michigan	218,999,753	230,287,992	e 218,999,753
Total	871,634.245	901,907,843	872,692,999

a To be changed to 16,697,489.
b To be changed to 875 541,741.
c Total of figures reported by W. Lindgren.
d Figure reported by C. Kirchhoff.
e Figure reported by ENGINEERING AND MINING JOURNAL.

We think it is sufficient to call attention to the fact that the Geological Survey has two sets of figures, the later and more elaborate of which closely checks our own, which were published soon after the close of 1905. We believe that the figures given by Mr. Kirchhoff and Mr. Lindgren for the output in California, which is also the figure given by the State Mining Bureau of California, is more accurate than our own figure for that State. Consequently, in conformity with our usual practice of revising our statistics in the light of the latest authoritative information, we shall adopt 875,541,741 lb. as the output of copper in the United States in 1905. The differences among the figures for the various States is due in part to the difficulty in making the proper allocation of copper which goes from one State to another for smelting. We are satisfied as to the accuracy of our distribution.

Pig Iron Production

The statistics collected by the American Iron and Steel Association give the production of pig iron in the United States in 1906 at 25,307,191 long tons, the greatest output ever reported, and considerably more than that of Germany and Great Britain combined. This completed total, it may be noted, differs by only 0.8 per cent. from the estimate given in the JOURNAL for Jan. 5 last; the discrepancy being due chiefly to the blowing out of several furnaces in December, for necessary repairs.

The report gives the production of pig iron in the United States, for two years past, as follows, in long tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Foundry & forge	5,837.174	25.4	5,714,492	22.6
Bessemer	12 407,116	54.0	13.840,518	54.7
Basic	4,105 179	17.9	5,018,674	19.8
Charcoal iron	352,928	1.5	433,007	1.7
Spiegel & ferro	289,983	1.2	300,500	1.2
Total	22,992,380	100.0	22,307,191	100.0

Foundry and forge iron showed a decrease last year of 122,682 tons. All other classes showed increases: bessemer, 1,433,402 tons; basic, 913,495; charcoal, 80,079; spiegel and ferro, 10,517 tons. The total gain was 2,314,811 tons, or 10.1 per cent. The most marked proportional change was in basic iron, which increased 22.3 per cent., while the gain in bessemer pig was 11.6 per cent. Foundry and forge irons lost 2.1 per cent.; while there were increases of 22.7 per cent. in charcoal pig and of 3.6 per cent. in spiegeleisen and ferromanganese.

The changes last year emphasize once more the steadily growing importance of the basic open-hearth process in this country. Nearly one-fifth of the pig iron made last year was basic iron, and this compares with less than 10 per cent. only five years ago. The classification, how-

ever, does not show the full growth of the open-hearth process, since no inconsiderable part of the bessemer pig—which includes low-phosphorus iron—is used in the acid open-hearth furnaces.

The extraordinary growth of our iron production is shown by the fact that in 1906 it was very nearly three times as great as that of 1896, which was 8,623,127 tons. Consumption has grown quite as fast, for even with the great output of last year, it was necessary during the closing months of the year to import some iron to meet immediate requirements.

Mendeleef

Prof. Dimitri Ivanovitch Mendeleef died at St. Petersburg, Feb. 2. He was one of the world's most renowned chemists, and one of the few scientists who have had the distinction of discovering a great natural law. The name of Mendeleef will ever be associated with the periodic law. Others had previously suggested a relation among the elements, but it remained for Mendeleef to formulate the various, more or less vague, ideas in a logical, working hypothesis. The general truth of that hypothesis was early proved in a dramatic way, the story of which is one of the classics of chemical literature.

On the basis of his hypothesis, Mendeleef predicted the existence of three elements, then unknown, and outlined their properties. It was not long before the three elements were discovered and isolated. They were what we know now as gallium, germanium, and scandium. Later discoveries in chemistry caused considerable revision of Mendeleef's original tabulation, but the principle remains unshaken and is regarded as one of the great fundamental laws of nature.

Prof. Mendeleef was born at Tobolsk, Siberia, in 1834, and in addition to being a distinguished chemist, was a geologist, philosopher and educationalist. He was the author of several important treatises on chemical subjects, and at the meeting of the Royal Society, last year, received the Cowley gold medal, esteemed among chemists as a high honor.

Production of Spelter in 1906

With their usual commendable promptness, Henry R. Merton & Co., Ltd., of London, have published their annual statistics of the production of spelter in the world. The figures, in tons of 2240 lb., for the last three years, are given in the following table:

	1904.	1905.	1906.
Belgium	137,780	143,300	150,060
Rhine	64,360	66,185	67,615
Holland	12 895	13 550	14,420
Great Britain	45,490	50,125	51,760
France-Spain	48 310	49 575	52,940
Silesia	123,695	127,895	134,180
Austria-Italy	9,100	9,210	10,610
Poland	10,440	7,520	9,460
Europe	452,070	467,360	491,045
Australia	.....	.....	1,010
America	163,220	180,360	196,245
Total	615 290	647,720	688,300

The figure for the United States, namely, 196,245 long tons, or 219,794 short tons, is somewhat lower than our report, Jan. 5, 1907, which was 225,395 tons, and we are of the opinion is too low. The United States showed the largest increase of any of the countries, but not enough to enable it to take the first place among the spelter producers. This is still held by Germany, which comprises the Rhine district and Silesia. Both Belgium and Silesia continued to show the large rate of increase which has been manifest for several years. Otherwise, the statistics disclose nothing of special interest. Poland regained its former position, the labor troubles which checked production in 1905 having been overcome. The increase in Great Britain was smaller than we had reason, a year ago, to expect, but that country will acquire a much more prominent position when the new works for the smelting of Australian ore, which are now being built, come into operation.

The Copper Bank

The organization of the National Copper Bank, which is talked of and probably will be consummated, ought to have an important effect on the copper-mining industry, especially in so far as investments and speculation in the stocks are concerned. The great reason for the prestige of Boston in those directions is the fact that the bankers there long ago became conversant with the value of many copper mines, and have been willing and anxious to accept their stock as collateral.

In New York it has been different. Loans on mining securities are made only under exceptional conditions. As a whole, the bankers, through ignorance, are unable to discriminate among the mining companies, and offers of their shares as security are looked at askance or refused flatly. Obviously, the National Copper Bank, which is to be backed by important mining capitalists, will be in a well-informed position. It ought to be, and doubtless will be, of benefit to the mining industry.

TASMANIA, like Utah, has its smelter-smoke question, a deputation of members of the town board of Queenstown having recently taken up the question of preventing or minimizing the escape of sulphurous gases from the Mt. Lyell furnaces. Mr. Sticht held out very little hope of an amelioration of the difficulty. This is one of the great metallurgical problems of the day, being of far more consequence now than formerly because of the immensely greater volumes of gas that are discharged by modern smelting works, which have been greatly increased in size. The problem is engaging the attention of the ablest metallurgists in several parts of the world.

HOW MANY OF the investing public know that in mining stock-jobbing, as in the patent-medicine business, the "sucker-list" plays an important part? The promoters, who look to the gullible for capital, income and profit, use a list of names of people known or supposed to be particularly susceptible to the blandishment of the get-rich-quick circular. This collection of names is treasured as a valuable asset and when it has been worked until it has brought in the last possible investor it is sold to the next promoter who has a scheme and a fine flow of language.

THE FIRST STATISTICS of the copper production in the world in 1906 come in the annual report of James Lewis & Son's, metal merchants, of Liverpool. Using the JOURNAL'S statistics for the production in the United States, this firm estimates the total production of the world in 1906 at about 730,000 long tons, against 708,000 tons in 1905, the increase being just about 3 per cent. There was an important increase in the production of Japan, Australia, and Spain, but some of the other countries showed decreases.

THE ABANDONMENT of the proposed consolidation of Lake Superior mining companies, which appears to have been due chiefly to failure to come to terms as to the value of the Copper Range property, is a cause for congratulation on several accounts. It checks a further step toward concentration of copper producton and preserves to the Boston market some of its best mining securities.

CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

The Need of Field Work in the Study of Ore Genesis

In an article published by the JOURNAL on Nov. 17, Messrs. Campbell and Knight have shown in an interesting way how the methods of metallography may be applied to the study of ores, using polished surfaces by reflected light instead of the thin sections generally used in petrography. For opaque substances the method supplements usefully the work of the petrographer, and, as they have shown for cer tain nickel ores and the complex silver ores of the Cobalt region,[1] gives the order of succession of the minerals now composing the ores. It should be kept in mind, however, that the new methods, like those of the older petrography, need to be constantly checked by the results of field work to prevent false conclusions.

Among other nickel ores those of the Sudbury region have been examined, and the order of deposit of the minerals in ore from several of the mines has been worked out, no doubt correctly, for the specimens studied. When, however, they go on to suggest that the origin of these ores was by deposit from solution, and replacement of silicates in a shattered rock, it is evident that they are drawing widely reaching conclusions from very narrow premises.

In reality the present relationships of the different minerals may be due to secondary rearrangements and so may give very little information as to the original source of the ores. In my large collection of thin sections of Sudbury norites and pyrrhotite-norites there are some badly weathered specimens which might be interpreted as Messrs. Campbell and Knight have interpreted their polished specimens; but the freshest sections, from the Creighton and Murray mines, give evidence of quite an opposite kind. In them biotite and hypersthene often inclose sharply edged particles and rounded masses of pyrrhotite and chalcopyrite, and in two cases pyrrhotite was found inclosed in magnetite. As the silicates and magnetite are often perfectly fresh and unchanged, this strongly suggests that the sulphides were part of the original magma and associated themselves with the ferromagnesian minerals when consolidation took place.

There is no hint of rounding or replacement of the pyroxenes or plagioclases with which the ore comes in contact, and the rock-forming minerals in the sections containing sulphides are in quite as unshattered and normal a condition as in fresh norites free from ore. How little circulating water had to do with the distribution of these sulphides is shown by the freshness of the hypersthenes beside them or inclosing them.

Petrographers know how subject hypersthene is to rearrangement. It is a curious and suggestive fact that the freshest examples of norite were collected at or near three of the great mines, the Creighton, the Murray and the Blezard, while in most of the norites from other localities at a distance from orebodies the hypersthene has been completely transformed to uralite or hornblende.

The broad field relationships are, however, far more inportant in judging of the origin of these ores than the study of thin sections of fresh of weathered rock, and those who wish to see in detail the evidence for magmatic segregation of the nickel ores may find it in Dr. Barlow's able report on the main nickel range,[2] or the present writer's final report on the region as a whole.[3] It may not be amiss, however, to give an outline of the field results, so as to show how strong the evidence is in favor of the theory of magmatic segregation.

All the ore deposits are connected with a single great sheet of eruptive rock, consisting of norite beneath and micro-pigmatite above. The ores occur as parts of the basic lower edge or as offsets from it, and no ore is found where norite is absent. The largest ore deposits occupy bay-like depressions of the country rock or offsets from such bays, since the ore was heavier than the norite and sank into all the hollows and openings of the rock beneath. Both ore and norite grow finer grained against the country rock.

Marginal ore deposits, like the Creighton mine, pass gradually into norite, the sulphides containing first a few crystals of plagioclase or pyroxene, then more and more of the rock-forming silicates, until the two are equally mixed, forming pyrrhotite-norite. Still farther in, one finds rock with scattered blebs or particles of ore, which may continue sparsely for hundreds of yards from the orebody.

On the other hand, the sulphides are never evenly disseminated through the country rock, which may be granite, gneiss, greenstone or graywacke, without having any effect on the character of the ore. The sulphides often penetrate the country rock as small ramifying veins, and inclose blocks of it. The ores are remarkably uniform round the whole nickel basin, which is 36 miles long by 16 miles wide. They are as monotonous as the norite, with which they are associated.

In the great marginal orebodies, like the Creighton and Murray mines, there is scarcely a hint of water action except in a few tiny later veins with some quartz and calcite. There is no trace of banding or crustation, no concentric structure round inclosed fragments of rock. That there has been some later rearrangement is shown, however, by the thin films of chalcopyrite penetrating seams in diabase dikes cutting the orebodies.

In some of the offset deposits, such as the Copper Cliff, water action is more prominent, though the ore is everywhere accompanied by norite spotted with sulphides, as in the marginal mines. Small amounts of quartz and carbonates occur as gangue minerals and sometimes a few other sulphides are found. Probably hot fluids circulated from the edge of the eruptive during the slow cooling of the sheet and modified and rearranged the minerals the offsets to a greater degree than in the marginal mines.

From the outline of the field relationships just given it will be seen how easily the orebodies may be accounted for by magmatic segregation, aided by gravity, and what serious difficulties lie in the way of any hydrothermal theory of their origin. Why should circulating water deposit precisely the same ores all round a vast sheet of eruptive rock and nowhere else, always at outward bays of the margin of the sheet and never at the inward bends? Why should circulating water leave no important traces of its action in the way of banding of the ores or the presence of gangue minerals? And finally, why should circulating water, with no visible channels, disseminate blebs of pyrrhotite and chalcopyrite through cubic miles of fresh norite, and carefully avoid such action on granite or greenstone on the opposite side of the marginal orebodies?

Until such questions as these can be answered it will be wise to retain the theory of magmatic segregation as the cause of the Sudbury ore deposits at least:

[1] *Economic Geology*, Vol. I, No. 8, pp. 767, etc

[2] *Geol. Sur. Can.*, Part H, 1904.

[3] *Bur. Mines of Ontario*, Part III, 1905.

and Professor Vogt's accounts of the Norwegian nickel ores make the theory equally probable in their case.

In conclusion, it should be said that the writer has no wish to disparage the work of Messrs. Campbell and Knight, which is very useful in giving the order of succession of ores deposited by water, such as those of the Cobalt silver district. It must be kept in mind, however, that the method shows only the latest arrangement of the minerals studied, and may throw very little light on the original source of the ores. A. P. COLEMAN.

University of Toronto, Toronto, Canada.

Increase of Moisture in Coke Shipped in Sealed Cars

The following corespondence has been referred to the JOURNAL with the hope that it may bring out a discussion of an interesting and perplexing problem.

What is the source of the moisture which appears in and about fresh coke when shipped in sealed box-cars? Opinion seems to be unanimous that water does enter or form in some mysterious way, but how has not been explained to the satisfaction of everyone. The theory suggested rather than advanced as an adequate explanation in one of the letters is ingenious and invites further discussion. W. N. Page, Pres., Ansted, W. Va.

My dear Mr. Page—I have been with the Pocahontas Coke Company for the past fifteen months, and we have a very large trade in Mexico, shipping via Lamberts Point and water to Tampico, thence all rail inland. We have had considerable trouble with moisture in coke at destination; one of our customers, the Mining Smelting and Refining Company, of Monterey, advising that the coke runs "in some cases, as high as 12 per cent. moisture, and our experience, covering a period of many years, shows that the general average will be between 4 and 6 per cent."

Of course, we know that there is no such amount of moisture in the coke when it leaves the ovens here, or in fact when it starts on its ocean voyage, and while some of it is loaded on deck, the great bulk of it goes in the hold of the ship, and should be protected from any moisture while on the water. After the coke is discharged in Mexico, especially during the dry season, it would seem to us that it should go through to its destination through some unaccountable reason, in without acquiring any moisture at all, in fact it should be even drier than when it left the ovens here.

My undertsanding is that it is the practice of loading this coke in box-cars with closed doors at Tampico, and in talking the matter over a few days ago with our mutual friend, J. A. Renahan, I learned of a similar experience with moisture which you had years ago, in shipping Gauley Mountain coke to Dennis Long & Company, Louisville, and advised that box-cars with closed doors, the coke arrived in Louisville so moist that water would run on the floor of the car and out of the doors.

Mr. Renahan advised that you made a trip to Louisville to investigate the trouble, and found that it was due to some chemical action of the air on the coke when inclosed in practically air-tight cars, and that this caused the coke to absorb moisture from the air and of course resulted in complaints from consignees on account of excessive moisture.

It has since struck me that I might impose on your good nature by asking you to write me at your leisure, an explanation of what our trouble might be in Mexico, and if you will be good enough to do it, at the same time advising what might be the remedy, I will certainly be very much indebted to you. As you will note from the above quotation, the trouble here has been one of long standing, and if I can give our friends in Mexico a satisfactory explanation of it, I am sure they, as well as myself, will feel under many obligations to you.

T. F. FARRELL, General Manager
Pocahontas Coke Company.

Bluefield, W. Va., Jan. 15, 1907.

The reply to this request follows:

My dear Mr. Farrell—Referring to your troubles with coke shipments to Mexico, I can state positively that freshly drawn coke loaded in sealed box-cars, in hot weather, will accumulate moisture, which, I think, is due to chemical action, and not to the absorption of moisture from the atmosphere. In the case you refer to I supervised the loading of 10 box-cars with freshly drawn coke, still warm from the oven, and containing less than 1 per cent. moisture. When this coke reached Louisville it contained 12 per cent. moisture, and water was dripping from the bottom of the cars. The same coke, when saturated in water for 48 hours, absorbed only 10 per cent. of moisture, showing that the cells contained water which could not have been absorbed by saturation. I wrote the principal coke manufacturers of the Connellsville district, asking their experience and theory upon the subject, and they all replied admitting the fact that when their cars were sealed they had complaints of water, which they never had when the doors were left open. They had no theory, but recognized the fact.

I published an article upon the subject in the ENGINEERING AND MINING JOURNAL, hoping to draw out a discussion and lead to a scientific investigation, but without success.

My own theory is that in watering down the coke in the ovens, superheated steam passing through the cell structure of the coke finds enough iron to combine with the oxygen, leaving the hydrogen free, which is caught in the cells of the coke and partly sealed by the carbon glaze, and that later on this hydrogen is given off slowly. Two atoms of hydrogen and one of oxygen, as you probably know, make water (H_2O), but this chemical union is generally accompanied by an explosion. It is a well known fact in chemistry, however, that certain substances, such as platinum sponge and fresh carbon, will combine oxygen and hydrogen gases into water without an explosion, and when coke is sealed in a car, or hold of a vessel, it is reasonable to presume that, as the hydrogen is given off, it unites with the oxygen, in contact with the carbon of the coke.

My experience, however, is that this trouble is most marked in hot weather, with freshly drawn coke, and with cokes that have the most glaze, such as Gauley Mountain and Connellsville. It is possible, however, that you may have the same trouble with Pocahontas coke (which as a rule is not glazed) in the tight hold of the vessel. In your case I would be inclined to look for the trouble elsewhere, either from contact with water from the ocean or from rains. If, however, you find the water is due to chemical action, the only remedy I can suggest is to keep the coke exposed to the atmosphere long enough to permit the escape of the hydrogen before shipment.

For years I have had trouble with the Chesapeake & Ohio Railway officials in keeping the car doors open. Orders are frequently issued to close and seal the doors on our coke shipments, and whenever this has been done I have had complaints of water, and it is still necessary to go into long explanations with these officials whenever such orders are issued. In several cases I have had complaints of water, and found that the doors had been closed and sealed in transit.

WM. N. PAGE.

January 17, 1907.

Detonators and Explosives

My attention was called, a short time ago, to two statements under the heading "Metallics" in the JOURNAL of December 29, 1906. The first one reads:

"While fire or shock may explode powder under favorable conditions, the use of a detonator is necessary to obtain the most power from the explosive."

This statement appears to me so vague and general in its wording, that it might lead a casual reader to form wrong conclusions. For instance, black powder can be exploded by flame and not by shock. Straight dynamite and gelatine dynamite can be exploded by shock, and yet, frequently, small amounts of these explosives burn harmlessly without any explosion whatever. The English government inspectors of explosives in one of their annual reports say that with care high explosives can be burned without explosion in lots up to 600 pounds.

The second statement reads:

"Dynamite can be detonated with two

grains of fulminate, but it requires at least ten grains of fulminate to detonate guncotton."

While I do not doubt the accuracy of this statement as regards the action of fulminate with fresh dynamite, I think this statement is liable to lead some users of explosives to follow methods not in accordance with the best practice.

Modern practice with high explosives has shown that the best results are obtained by using very strong detonators. The use of powerful detonators is recommended by all the leading manufacturers of explosives. The weakest cap sold by the DuPont company has a charge of 7.7 grains, and with the gelatine dynamite no complaint will be entertained unless a cap or exploder equivalent to a DuPont quintuple strength is used.

CHAS. M. BARTON.

Wilmington, Del., Jan. 29, 1907.

Volumetric Estimation of Tin

In James Darroch's reply to my criticisms in regard to his claims covering the volumetric estimation of tin he says that the article in question did not, nor did it pretend to, describe a "new volumetric" assay for tin, and he goes on to state that the essential part of the method described by him is the means adopted for getting the stannic oxide into solution.

Mr. Darroch admits that he claims no novelty for the use of ferric chloride and he says that the reaction has long been known and applied in the case of iron. This is quite true, the reaction between Fe_2Cl_6 and $SnCl_2$ has been known long enough. When, however, Mr. Darroch goes on to say that it has been used in the assay of tin ores as is shown in "Assaying and Metallurgical Analysis," by Rhead and Sexton, he is mistaken. The principle of the method described in the book he refers to is not the same as that of the ferric chloride titration. As Mr. Darroch says, in Rhead and Sexton's method excess of Fe_2Cl_6 is added and the excess estimated with $SnCl_2$, or the reduced $FeCl_2$ determined with bichromate.

I did not suggest that I was the first assayer to use the above reaction. I said I was responsible for most of its applications to tin materials, and I will add that I was the first to publish a proper description of those applications.

L. PARRY.

Huddersfield, Eng., Jan. 6.

Manganese Ore in Newfoundland

The statement that there is no reference to any deposit whatever of manganese ore in the publications of the Geological Survey of Newfoundland, is no doubt true. Nevertheless, manganese ore has been found and does exist at the town of Killegrews on Conception bay, about 16 miles west of the city of St. Johns, N. F. It underlies an area of about 4 sq. miles and is found in a stratum about 8 ft. thick.

I inclose an analysis made of the ore some four years ago by Professor Brunton of the Imperial Institute. It shows the ore to be fairly rich but it contains a somewhat large proportion of silica. This I am told can be got rid of, and the ore brought up to bessemer standard.

MANGANESE ORE FROM THE NEWFOUNDLAND DEPOSIT

Moisture	8.08	per cent.
Combined Water	8.40	per cent.
Silica	17.56	per cent.
Ferric Oxide	2.88	per cent.
Alumina	3.96	per cent.
Manganous Oxide	15.50	per cent.
Manganese Dioxide	41.13	per cent.
Lime	.26	per cent.
Magnesia	.41	per cent.
Baryta	Nil	
Cupric Oxide	.036	per cent.
Soda	.55	per cent.
Potash	.41	per cent.
Sulphur	.062	per cent.
Phosphorus	.100	per cent.
Carbon Dioxide	Trace	
Total Metallic Manganese	38.01	per cent.

J. J. WHITTLE.

New York, Dec. 20, 1906.

Potatoes as Quicksilver Retorts

To my friend Michael Gillon, an old timer and placer miner of Montana, I am indebted for the following practical idea. It is a retort for small amounts of amalgam such as the prospector, or the engineer, making test runs from prospect pits in placer ground, often has to deal with. The prospector who is perhaps far from his base of supplies does not care to pack any considerable quantity of "quick" and to him it is especially important to recover as much as possible, both for this reason and because of the value of the metal.

A "spud" with a good sound hide is selected the op taken off one end, and a small cavity hollowed out to receive the ball of amalgam. A hot iron plate (shovel, frying pan or other convenient piece) is pressed down over the cut end of the potato which is seared to the hot plate. The whole is then turned over and a bed of coals may be heaped over it. When the potato is thoroughly cooked it may be crumbled up into water. After removing the gold button, the quicksilver may be recovered by washing away the baked potato. L. S. ROPES.

Basin, Mont. Jan. 25, 1907.

French Zinc White

Is French zinc white made in the United States? If so, where and by whom? For what purpose is it used, and what is its value as compared with ordinary American zinc white? J. F. B.

New York, Feb. 1, 1907.

French zinc white is made by the combustion of spelter, which is the method by which all of the zinc white made in Belgium (commonly known as French zinc white) is produced. It is made in the United States, at Florence, Penn., by one of the subsidiary companies of the New Jersey Zinc Company. We know of no other manufacturer in the United States. This grade of zinc white is employed for the highest class of white painting, such as interior decoration, etc. Its value is from two to three cents per pound in excess of that of the ordinary oxide made directly from ore.

Le Roi Mining Company

This report deals with the operations during the fiscal year ended June 30, 1906, and the accounts show a balance in favor of the profit and loss account amounting to £37,138 from the year's transactions, to which is added a sum of £150,539, carried forward from the previous year, making a total of £187,677. Out of this, dividends amounting to 3½ per cent. for the year were disbursed. These were the first dividends paid by the company since 1899. A sum of £150,927 was carried forward to the accounts for the present year. The report briefly refers to the scheme of former directors for amalgamating the Le Roi with other mining and smelting interests in British Columbia, which through the energetic action of A. J. McMillan, the managing director in British Columbia, was rejected by a large majority vote of the shareholders. Mr. McMillan has succeeded in canceling the contract made between the former directors and the owners of the Trail smelters for dealing with all the Le Roi ore on terms which were reported to be against the best interests of the company. The cancelation was based on the consideration of the company supplying the smelter with a total of 170,000 tons of ore at a stipulated figure, in place of the total output of the mine for the next three years. The company's smelter at Northport is again in commission, and when the balance of the ore is supplied to the Trail smelter, all the company's ore will again be sent to Northport.

During the year reviewed, 110,042 tons of ore were mined, the average metal contents being 0.39 oz. gold; 0.54 oz. silver; and 1.16 per cent. copper, equal to an average value of $12.37 per ton. The cost of mining and delivering the ore to cars on railroad amounted to $2.84 per ton.

The development work amounted to 7180 ft., comprising 262 ft. of rising, costing $33 per ft.; 152 ft. of winzes, costing $42 per ft.; 2245 ft. of crosscutting, costing $16 per ft.; and 4522 ft. of drifting, costing $16 per ft. In addition 303 ft. of diamond drilling was done, and as the results were highly satisfactory it was determined to commence prospecting by drilling from the 800-ft. level.

The managing director concludes his report by expressing the opinion that the mine looks better today than he has ever seen it previously, and, unless unforseen circumstances intervene, the present year promises to be a very satisfactory one for the shareholders.

New Publications

The book departments of THE ENGINEERING AND MINING JOURNAL, *Power* and the *American Machinist* have been consolidated, and the business will hereafter be transacted under the name of the Hill Publishing Company, Book Department. The company will publish scientific books of all kinds, but will pay particular attention to those which come within the fields of the three papers mentioned above. Authors, or prospective authors, of books on mining, metallurgical, chemical and mechanical engineering, industrial chemistry, economic geology and general technical subjects are requested to correspond with the Hill Publishing Company with a view to their publication.

"Illustriertes Handlexikon." By Karl Selbach. Pp. 160; illustrated. 7x11 in.; paper, 6 marks. Leipzig, 1906: Carl Scholtze.

"Punches, Dies and Tools for Manufacturing in Presses." By Joseph V. Woodworth. Pp. 483; illustrated. 6x9 in.; cloth, $4. New York, 1906: Norman W. Henley Publishing Company.

"The Yukon-Tanana Region, Alaska. Description of Circle Quadrangle." By L. M. Prindle. U. S. Geological Survey, Bulletin No. 295. Pp. 27; illustrated. 6x9 in.; paper. Washington, 1906: Government Printing Office.

"Geology and Gold Deposits of the Cripple Creek District, Colorado." By Waldemar Lindgren and Frederick Leslie Ransome. U. S. Geological Survey, Professional Paper No. 54. Pp. 516; illustrated. 9x11½ in.; paper. Washington, 1906: Government Printing Office.

"Electrical Wiring and Construction Tables." By Henry C. Horstmann and Victor H. Tousley. Pp. 118; illustrated. 4x6 in.; leather, $1.50. Chicago, 1907: Frederick J Drake & Co.

Contents. Direct current wiring tables. Alternating current wiring tables. Economy of conductors. Miscellaneous. Calculation of materials. Conduits and wires. Tables of carrying capacities.

"Practical Metal Turning. A Handbook for Machinists, Technical Students and Amateurs." By Joseph G. Horner. Pp. 404; illustrated. 5½x8 in.; cloth, $3.50. New York, 1906: Norman W. Henley Publishing Company.

Contents. The lathe, its work and the tools. Turning between centers. Work supported at one end. Internal work. Screw cutting and turret work. Miscellaneous matters.

"Manufacture of Metallic Objects Electrolytically. Electro-Engraving." By W. Pfanhauser. Authorized English Translation by Joseph W. Richards. Pp. 162; illustrated. 6x9 in.; cloth, $1.25. Easton, Penn., 1906: Chemical Publishing Company.

Contents. Historical review. Baths for copper galvanoplasty. Physical properties of the copper deposit. Behavior of copper anodes. Constants of the bath and calculation of the amount of deposit. Industrial plants. Particular devices for special purposes. Production of uniform deposits. Manufacture of metallic powders and the like. Manufacture of metallic foil. Production of wire, etc. Manufacture of bodies of large size. Manufacture of parabolic mirrors. Manufacture of tubes. Electrolytic etching. Electrolytic engraving. Appendix.

"Modern Milling Machines, Their Design, Construction and Working. A Handbook for Practical Men and Engineering Students." By Joseph G. Horner. Pp. 394; illustrated. 6x8½ in.; cloth, $4. New York, 1906: Norman W. Henley Publishing Company. London: Crosby, Lockwood & Son.

Contents. The leading elements of milling machine design and construction. Plain and universal machines. Attachments and bracings. Vertical spindle machines. Piano-millers or slabbing machines. Special machines. Cutters. Milling operations. Indexing, spiral work, and worm, spur and bevel gears, etc. Spur and bevel gears. Feeds and speeds.

Patents Relating to Mining and Metallurgy

UNITED STATES

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which the notice of the patent appeared.

Published Week Ended Jan. 15, 1907.

GAS-PRODUCER—Cyril J. Atkinson, Milwaukee, Wis., assignor to International Harvester Company. No. 841,100. Filed May 7, 1906.

PROCESS OF TREATING ORES—Charles E. Baker and Arthur W. Burwell, Cleveland, Ohio. No. 841,103. Filed Mar. 1, 1905. Renewed July 5, 1906.

GAS-PRODUCER—Henry K. Cowen, Chicago, Ill., assignor to International Harvester Company. No. 841,123. Filed May 7, 1906.

ROCK-DRILL—Arthur H. Gibson, Easton, Pa., assignor to The Ingersoll-Sergeant Drill Company, New York, N. Y. No. 841,139. Filed July 28, 1905.

EXPLOSIVE—August E. Nienstadt, Newark, N. J., assignor of one-half to George H. Rosenblatt, New York, N. Y. No. 841,172. Filed Jan. 30, 1906.

PROCESS OF MIXING METALS—John D. Prince, New York, N. Y., and Howard S. Rodgers, Covington, Ky. No. 841,178. Filed April 16 1904.

COMBINED GAS-GENERATOR AND SMELTER—William H. Adams and Frederick Powell, Portland, Oregon, assignors of twenty-five one-hundredths to said Adams, fifteen one-hundredths to said Powell, and sixty one-hundredths to The Ladd Metals Company, Portland, Oregon. No. 841,212. Filed July 16, 1904.

WELL-DRILLING APPARATUS—George D. Loomis Tiffin, Ohio. No. 841,259. Filed May 12, 1906.

MINE-CAR BRAKE-SHOE—Daniel S. Miller and John M. Landfair, Black Lick Station, Pa. No. 841,264. Filed Sept, 26, 1906.

ART OF CASTING METAL—Charles S. Szekely, Sr., New York, N. Y., assignor to Metal Moulds Corporation, New Jersey. No. 841,279. Filed Dec. 14, 1903. Renewed Apr. 25, 1906.

MOLD FOR CASTING CHILLED ROLLS—Ralph H. West, Sharpsville, Pa. No. 841,293. Filed May 3, 1906.

PIGMENT AND PROCESS OF MAKING SAME—William J. Armbruster, St. Louis, Mo. No. 841,303. Filed Nov. 8, 1902. Renewed June 3, 1905.

ORE CHLORINATION—Wintworth V. Lander, Newton, Mass. No. 841,328. Filed April 27, 1906.

CHLORINATING APPARATUS—Wintworth V. Lander, Newton, Mass. No. 841,329. Filed Apr. 27, 1906.

ORE-CYANIDING—Wintworth V. Lander, Newton, Mass. No. 841,330. Filed Apr. 27, 1906.

CYANIDING APPARATUS—Wintworth V. Lander, Newton, Mass. No. 841,331. Filed April 27, 1906.

COAL-WASHER—William M. Duncan, Alton, Ill. No. 841,382. Filed Sept. 4, 1906.

MINE-SHAFT—Josef Mika, Bottrop, Germany. No. 841,416. Filed Apr. 4, 1906.

ASSAY-BALANCE—Robert G. Ainsworth, Denver, Colo. No. 841,477. Filed May 8, 1905.

PROCESS OF MANUFACTURING POWER-GAS—Emil Fleischer, Dresden-Strehlen, Germany, assignor to Jakob Eduard Goldschmid, Frankfort-on-the-Main, Germany. No. 841,499. Filed Nov. 30, 1904.

SULPHUR-BURNER—Charles E. Savage, Groveton, N. H. No. 841,576. Filed Oct. 24, 1906.

AERIAL SYSTEM FOR MINING PURPOSES—George G. Schroeder, Washington, D. C., assignor to Industrial Transportation Company. No. 841,582. Filed Oct. 10, 1904. Renewed June 25, 1906.

MINING-MACHINE—William B. Chapman, Wilburton, Ind. Ter. No. 841,625. Filed June 27, 1905.

GREAT BRITAIN

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended Jan. 19, 1907.

MUFFLE FURNACE—W. F. L. Frith and C. G. Grist, London. Improved furnaces or muffles for heating steel articles to a very high temperature in an atmosphere of mercury. No. 26,578 of 1905.

PULVERIZER—W. R. Mackay, London. Improvements in pulverizing machines in which rotating arms beat round close to the periphery which is made with corrugations, or other unevenness. No. 27,080 of 1905.

METHOD FOR ELECTROLYSIS—E. Hermite, Paris, France. In electrolytic processes, means for keeping the electrolyte constantly in a saturated form. No. 2466 of 1906.

MINE DOOR ATTACHMENT—J. Mika and A. Nowrotok, Dellwig, Germany. Method of controlling the opening and shutting of mine doors. No. 3635 of 1906.

TANTALUM FILAMENTS—J. Lux, Vienna, Austria. Improved method of manufacturing tantalum filaments for use in electric lamps. No. 7803 of 1906.

NODULIZING FINE ORE—T. C. King, New York, U. S. A. Method of forming porous nodules of fine ores in suitable shape for smelting, by partially fusing the fine ores. No. 9687 of 1906.

ELECTRIC FURNACE—N. A. Wallin, Berlin, Germany. In electric smelting furnaces using induced currents, arranging the parts in such a way that the currents shall pass through the unsmelted ores instead of continuously following the reduced metal. No. 12,395 of 1906.

THERMITE—J. Buchel, Vorarlberg, Austria. Method of binding thermite into briquettes. No. 13,764 of 1906.

ELECTRIC FURNACE—K. Kaiser, Berlin, Germany. In electric furnaces such as are intended for reducing zinc from zinkiferous pyrites, using a blast of reducing gas instead of adding carbon to the charge. No. 15,818 of 1906.

AIR-DRILL—H. Flottmann, Herne, Germany. A method of rotating the drill in air drills. No. 17,828 of 1906.

JAW CRUSHER—A. James, London. In jaw breakers improved arrangements of the toggle bars and plates. No. 18,492 of 1906.

METALLURGICAL PROCESS—Rhenisch Nassauische Company, W. Borchers and A. Graumann, Aachen, Germany. Improvements in the process for extracting zinc from sulphide by the reaction of metallic iron. No. 24,096 of 1906.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

J. C. Haas, of Spokane, Wash., has gone East for six weeks.

C. S. Herzig, mining engineer, London, England, is in Spain on professional business.

A. J. Smith, of Central City, Colo., has returned from a visit of inspection to mining property in New Mexico.

T. R. Cudahy, of Central City, Colo., has returned from an examination of mines in the Ely district, Nevada.

F. C. Burnham, of Denver, who is heavily interested in Gilpin county, Colo., has gone east on mining business.

W. W. Degge, a Boulder county, Colo., operator, has returned from a visit to mining interests in the Nevada camps.

Robert S. Botsford, of London, left England, Jan. 17, for Buenos Aires, to take an appointment in Argentina.

F. E. Himrod, of New York, has been in Clear Creek and Gilpin counties, Colorado, looking after mining interests.

Louis D. McCall, of Chicago, has been spending a week in Gilpin county, Colo., while looking after mining interests.

W. E. Wilson, of Boulder, Colo., is paying a visit to property in which he is interested at Silver City, New Mexico.

C. L. Schellenger, a mining operator of Eldora, Boulder county, Colo., has returned from a business visit to the East.

George E. Wynne has been appointed acting general manager of the Lake Superior Corporation, at Sault Ste. Marie, Ontario.

W. M. Cooper, manager of the Capitol Prize Mining Company, of Georgetown, Colo., has returned from a business visit to Pittsburg.

George W. Teagarden, of the Ramsdell Mining Company, operating at Georgetown, Colo., has left on a business visit to eastern points.

Frank G. Carpenter left Denver recently for the Black Hills and expects to proceed thence to Bolivia, South America, on a professional trip.

Eugene Coste, of Toronto, Ont., is superintending oil-well boring operations at Langham on the Saskatchewan river, northwestern Canada.

Thomas Cornish, of Denver, has been looking at mining property in the Georgetown and Silver Plume districts, Clear Creek county, Colorado.

H. C. Hoover, of London, England, sailed last week for Australia for his perodical visit to all the properties of Bewick, Moreing & Company.

Robert R. Hedley has resigned his position as manager of the smelter of the Hall Mining and Smelting Company, Ltd., at Nelson, British Columbia.

J. H. Crawford, manager of the Scotia Mines Company, operating at Silver Plume, Colo., has returned from a visit to Kansas City, Missouri.

James A. Gilmour, of Central City, Colo., left last week for the Shoshone reservation, Wyoming, to examine mining properties for Chicago people.

Dan and Watson MacMasters, of the Grand Central Mining Company, operating at Central City, Colo., are making a business visit to New England.

J. A. McDonald has been appointed superintendent of the Ohio Steel Works and of the blast furnaces of the Carnegie Steel Company at Youngstown, Ohio.

E. A. Ritter, of Colorado Springs, Colo., is making an examination of properties in the Pine Creek district, Gilpin county, in the interest of Eastern investors.

Guy R. Johnson has been elected vice-president and general manager of the Alabama Consolidated Coal and Iron Company, with headquarters in Birmingham, Alabama.

A. J. Trone, of Thibodaux, La., has been making a visit to Clear Creek county, Colo., to look at newly acquired interests, in connection with other Louisiana capitalists.

H. C. Bellinger has resigned the management of the Britannia Smelting Company's smelting works at Crofton, Vancouver island, B. C., and has been succeeded by S. S. Raymond.

J. B. Tomlinson and B. M. Norton, of El Paso, Texas, have opened a branch office as consulting engineers, in Douglas, Arizona. In connection they have established a laboratory and assay office.

Alexander Faulds has been appointed mine superintendent for the Nicola Valley Coal and Coke Company, recently organized to open up a coal property in the Nicola district of British Columbia.

Robert W. Hunt & Co., of Chicago, have been appointed consulting engineers to the receivers of the Union Traction Company, Chicago, and placed in direct charge of the lowering of the car tunnels under the Chicago river.

B. C. Yates, J. A. Spargo, Richard Blackstone and W. S. O'Brien, officials of the Homestake Company, in South Dakota, have been visiting the Idaho Springs section of Clear Creek county, Colo., inspecting the Newhouse tunnel.

N. O. Lawton, formerly mining in Michigan and later in Newfoundland, has been appointed manager of the mines in northern British Columbia and southeast Alaska of the Brown-Alaska Company, of New York, in place of J. L. Parker.

Charles E. Coxe, mining engineer, has left Chalchihuites, Zacatecas, and is now with La Mona Mining Company at La Mona de San Pantaleon, which is about 15 miles from Sombrerete, Zacatecas, Mexico, the nearest post-office.

O. E. S. Whiteside, manager of the West Canadian Collieries, Ltd., owning coal mines in the Blairmore-Frank district, southwest Alberta, has returned to Blairmore from an extended business trip in the East.

Jeffries White has resigned his position as general superintendent of the Oaxaca Exploration Company and has accepted the position of general manager of the Providencia San Carlos Mining Company, at Taviche, Oaxaca, Mexico.

C. T. Alden has been placed in charge of the recently organized electrical department of W. S. Barstow & Co., New York and Portland, Oregon. He has been with the American Locomotive Company, the General Electric Company, and the Bath Iron Works.

W. G. Devereux, of the firm of W. B. Devereux & Sons, New York, is at present engaged in professional work in Panama; and W. B. Devereux, Jr., will be engaged in professional work during the months of February and March in southern California and Nevada.

Henry F. Lefevre returned to New York last week after spending nine months in making a thorough investigation of the mineral resources of Honduras and Nicaragua. He sails this week for Peru, on professional business, and expects to be absent until May next.

J. E. McAllister, manager for the British Columbia Copper Company, is in New York for expert medical advice, illness preventing his performing his duties. In his absence G. F. Beardsley, of West Somers, N. Y., is in charge of the company's smelting works at Greenwood, Boundary district of British Columbia.

G. M. Gouyard returned to Denver recently and left for Arizona and Mexico on professional business. He has just been appointed consulting engineer for the Bonanza Belt Copper Company, of Johnson, Arizona. Walter L. Ehrich has been appointed superintendent of that company.

P. L. Williams, Jr., has resigned the position of superintendent of the Utah Consolidated at Bingham, Utah, and has accepted the position of general superintendent of the mines under the general management of Ernest Bamberger and associates of Salt Lake. Mr. Williams has been succeeded by M. Rhiney, of Butte, Montana.

W. E. Zwicky, of Kaslo, B. C., manager of the Rambler-Cariboo Company's mine in McGuigan basin, and the Krao mine at Ainsworth, both in the Slocan district, has been appointed by the Supreme Court of British Columbia to do certain work deemed necessary to supply further evidence in the extra-lateral rights case of the Star Mining Company vs. the Byron White Company.

Obituary

H. C. Weber, superintendent of the Weber Gas Engine Company, of Kansas City, Mo., died Jan. 21, in Phœnix, Arizona.

Captain T. F. Singiser died at Sioux City, Iowa, last week. He was president of the American Flag Mining Company, operating at Park City, Utah. He was formerly engaged in mining in Idaho, and served that commonwealth as delegate in Congress before it became a State.

John Osgood died at his home in New York, Jan. 31, aged 88 years. He was born in Canada, but passed most of his life in this country. He was for many years engaged in the making of iron in the northern part of New York, being one of the pioneers in the industry in that section.

Samuel T. C. Dodd died at Pinehurst, N. C., Jan. 30, aged 71 years. He was born and brought up in Franklin, Penn., and began to practice law in that town about the time of the first discovery of petroleum in the neighborhood. In the earlier contests between the Rockefeller interests and the independent producers, he took a prominent part on the independent side; but in 1881 he was appointed general solicitor of the Standard Oil Company, and held that position for 24 years, then retiring from active work, but retaining the title of general counsel.

Henry C. Sergeant died at his home, in Westfield, N. J., Jan. 30, aged 72 years. He was known all over the world as an inventor who did much to forward the mining industry by his work in connection with the rock drill and air compressor. The original power drill and many later improvements; quarrying and channeling machines; coal-cutting machinery, and air compressors, were all included in his activities. He was for many years prominent in the management of the Ingersoll-Sergeant Company. When that company and the Rand Drill Company were consolidated, a short time ago, as the Ingersoll-Rand Company, he retired from active work, on account of his health, though retaining a large interest in the new company.

Societies and Technical Schools

Iron and Steel Institute—The annual general meeting will be held in London, England, May 9 and 10 next.

Engineers' Club of Philadelphia—At the annual meeting in Philadelphia, Jan. 19, the following officers were chosen: President, Henry H. Quimby; vice-president, W. P. Dallett; secretary, Walter Loring Webb; treasurer, George T. Gwilliam; directors, J. W. Ledoux, John T. Loomis, and Emile G. Perrot.

American Institute of Mining Engineers—A circular from the secretary's office says that the ninety-second meeting of the institute for the reading and discussion of professional papers will be held in New York City, beginning probably April 18, 1907. Further particulars will be given in a later circular. By reason of the overwhelming work entailed by the London meeting, and the confusion and distraction involved in the removal of the executive offices of the institute to the new building, requiring the constant presence of its officers in this city, it was found impracticable to make arrangements for any meeting during the winter, away from New York. On the other hand, a meeting of the institute in New York, before the formal dedication of the new building, was, for obvious reasons, inadvisable. It was therefore decided to hold the next meeting in this city, immediately after the said formal dedication, the ceremonies of which are expected to take place April 16 and 17.

The annual business meeting of the corporation will be held at the office of the institute, 29 West Thirty-ninth street, New York City, on the third Tuesday in February (Feb. 19, 1907.) At this meeting, members and associates present in person or by proxy will elect three directors of the corporation, and the officers and members of the council, as required by the constitution. The following list comprises all the nominations received for officers of the council: For president of the council, John Hays Hammond, New York City; for vice-presidents of the council, Samuel B. Christy, Berkeley, Cal.; John A. Church, New York City, and Persifor Frazer, Philadelphia, Penn.; for councilors, B. F. Fackenthal, Jr., Easton, Penn.; H. O. Hofman, Boston, Mass., and Walter R. Ingalls, New York City; for secretary of the council, R. W. Raymond New York City.

Industrial

The Link-Belt Company has recently opened a new branch office in the Ellicott Square building, Buffalo, N. Y., under charge of H. C. Minier. Also one in the New York block, Seattle, Wash., in charge of A. C. Brabrook.

The Lehigh Portland Cement Company, at Allentown, Penn., has removed from its cement-manufacturing plants the cement-burning apparatus embodying the natural-draft system, which necessitates the use of high stacks in order to get the necessary draft. Compressed-air apparatus made under the Hurry & Seaman patents is being installed in place of the former system.

The Pompton Steel Works, Pompton, N. J., it is announced, will be removed to Watervliet, N. Y., where a site of about 30 acres along the tracks of the Delaware & Hudson will be occupied. The destruction of Pompton lake by a flood about three years ago, making it difficult to secure adequate water power, forced the move. The Pompton works have been in operation since Revolutionary days.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Buffalo Forge Company, Buffalo, N. Y. Catalog No. 77. Buffalo Blacksmith Tools. Pp. 37, illustrated, paper, 3½x6½ in.; 1907.

Keuffel & Esser Company, 127 Fulton street, New York City. Federal Blue Printing Machine; Reckoning Machines. Pp. 4, illustrated, paper, 6x9 in.

Construction News

Idaho Springs, Colorado—Heavy machinery is planned for the Specie Payment mine. C. Wells, Idaho Springs, Colo., is manager.

Eldora, Colorado—The Alton Mining Company will install shaft and tunnel machinery during the coming spring. H. F. McClellan, Cardinal, Colo., is manager.

Breckenridge, Colorado—The Jessie Consolidated Mines Company is going to enlarge its stamp mill, and add a cyanide plant. Charles F. Gilbert, Breckenridge, Colo., is superintendent.

Masontown, West Virginia—The Preston County Coke Company is preparing to open and develop mines, and will need machinery. Fred C. Keighley, Uniontown, Penn., is vice-president and general manager.

Chrome, New Jersey—The United States Smelting, Refining and Mining Company expects to enlarge its refining and smelting plants, before long, nearly doubling their capacity. The main office is at 50 Congress street, Boston.

Hahns Peak, Colorado—Reduction works, with a daily capacity of 100 tons, are planned for next season by the Hahns Peak Mining, Milling and Refining Company, on Willow creek, as well as the installation of an electric-power plant.

Cumberland, Maryland—The Cumberland Basin Coal Company proposes to enlarge operations and will need hoisting and other machinery, also material for a spur railroad about three miles long. The office is at 44 South street, Baltimore. W. de L. Walbridge, No. 1 Broadway, New York, is largely interested.

Georgetown, Colorado—A mill is planned for the spring by the Key West Mining Company, operating on Leavenworth mountain. New machinery is planned for tunnel driving by the Bi-Metallic Company, of which J. W. Boughton, Georgetown, Colo., is manager. A large plant of machinery is to be installed during the early spring by the Krupps Mining Company, of which J. Tucker, Georgetown, Colo., is manager.

Special Correspondence

San Francisco Jan. 30

The jury in the Champion-Home mining case, at Nevada City, has rendered a verdict in favor of the Champion Company for $25,000, although the total amount sued for was $83,000. This is an apex case, and was the most important ever tried in the county. The Home Company—the defendant—was given a stay of execution for 20 days, during which time an appeal will doubtless be prepared. The case has been on trial since November last, and numbers of expert witnesses have testified in it. The underground workings of the two mines came together beneath the surface holdings of the Champion. Both companies claimed the orebodies. The Home Company had removed hundreds of tons of rock from the disputed ground before the underground workings came together, and suit was brought to recover the value of this ore. The defense of the Home Company was that the disputed orebodies were a part of a mineralized zone that extended through its workings. The Champion Company claimed that no such zone existed and that the workings involved in the case were part of its ledge. The Champion Company, which won the suit, was represented by Attorney W. H. Metson, of San Francisco, while Judge C. H. Lindley represented the Home Company. Another suit is pending to determine the ownership of the disputed workings, which may be called up at any time. The case has been watched carefully by mining men, as it involves many interesting points of mining law. The litigation had caused the virtual closing of both mines for about two years in Nevada City district.

It is thought that the trouble between the Anti-Débris Association and the dredge miners may be settled without litigation. The dredging men were taken somewhat by surprise when they heard of the proposed suits against them, and deny most emphatically that material from their mines is being carried to the river. None of the dredges, they assert, discharges its water directly into the river. It percolates through piles of dredge tailings and all the material that could do damage is deposited before the water reaches the river. The dredging men acknowledge that the water is badly discolored. They account for this, however, by the fact that the water carries a solution of fine silt, which coming from the red soil badly discolors it, but is too fine to do any damage. It is so fine, they assert, that when water is bottled it will take a week for it to settle. On the other hand, the Anti-Débris people aver that the objection raised as to operation of the dredges is not to the discolored water seeping through the tailings, but that during periods of high water the river forces its way into dredging ponds of the river boats, carrying out with it a load of gravel and sand that is later deposited as the stream makes its way through the valley. The association desires that the dredging companies build restraining dams. To this the dredge men never have objected.

According to the statement of Lewis T. Wright, general manager of the Mountain Copper Company, two of the five furnaces at Keswick, Shasta county, will shortly be started up again. The smelter has been closed for two years, during which time the town of Keswick has lost three-fourths of its inhabitants. The smelter had five furnaces in operation at one time. Only two of these are to be put in commission, one of them to be kept running all the time and the other held in reserve. Ore from the Hornet mine, as well as from the Iron Mountain mine, will be smelted and reduced to a low-grade matte that will be shipped to the Martinez plant for further treatment. The branch railroad from the Iron Mountain narrow-gage leading to the smelter will be completed by the time the furnaces are ready to be blown in. The work of repairing the smelter will be completed in about two months. When the company changed its base of smelting operations to Martinez, much of the machinery in the Keswick plant was moved. It is not expected that the smelter at Keswick will ever again be run up to its full capacity, as the new plant near Martinez is of greater extent and capacity. The Mountain Copper Company was so harassed by suits against it about smelter fumes that it virtually abandoned Shasta county as a smelting locality.

The sale of the property of the bankrupt Copper King Company, of Fresno county, takes place in this city, Jan. 31. Many of the liens against the property have been paid off by George W. Ade, the receiver, who has worked the mine a year or more for the benefit of the creditors and shipped the ore to Everett, Washington, for reduction. The mine is mainly owned by residents of Glasgow, Scotland.

The continuous storms of late have done considerable damage to mining properties not in operation by filling shafts with water, causing caves, etc. Numbers of mines in the higher mountains have had to close down owing to the great depth of snow, throwing many miners out of work. However, this is not an unmixed evil, as there is a heavy storage of snow in the mountains, insuring a large supply of water in the streams the coming summer.

Salt Lake City Feb. 1

The ore and bullion settlements reported through Salt Lake banks during the past week amounted to $577,200.

The appeal in the "smelter smoke" cases, which were tried in the Federal court here and brought forth a drastic decision from Judge John A. Marshall in favor of the farmers who instituted the suits, has been filed in the United States Court of Appeals at St. Louis. Judge Marshall rendered his decision on Nov. 12 last and permanently restrained the Utah Consolidated, United States, Bingham Consolidated and American Smelting and Refining companies from continuing to smelt ores carrying over 10 per cent. sulphur in any form or combination at their smelting plants. The complainants are James Godfrey and 408 owners of property aggregating 9000 acres of land near Salt Lake City. Notwithstanding the appeal has been taken, at least two of the defendant smelting companies have decided to move out of the Salt Lake valley. The Utah Consolidated has selected a site in Tooele county, and it is practically a certainty that the Bingham Consolidated will go there, too.

The American Consolidated Copper Company has been formed here to operate in the Big Cottonwood, Utah, district. J. C. Barnard is president; H. C. Edwards, vice-president; F. O. Frick, secretary and treasurer, with offices in the McCornick Bank building, Salt Lake City.

The management of the Ohio-Kentucky Mining Company, operating at Pioche, Nev., has reported the strike of a high-grade body of lead-silver ore in the Susan Duster shaft at a depth from the surface of 170 ft. Samuel Newhouse recently became president of the company. It is said that a reorganization will shortly be effected and operations conducted there upon a very large scale.

At the annual meeting of the Silver King Mining Company the old board of directors was elected. The only change made was in the secretaryship; John A. Malia tendered his resignation and was succeeded by Peter Tallon, of Park City. David Keith, of Salt Lake, is president and Thomas Kearns manager.

The ore-transportation situation in Bingham will be much improved from now on through the opening to regular traffic of the new branch line built into the camp by the Rio Grande Western and known as the "skyline." For several months the facilities afforded by the Copper Belt Railroad have been inadequate to meet the demands of mine operators and much complaint from the latter has been the result. The output of the camp will now be materially increased. It is still somewhat of a question among Bingham producers about the Rio Grande being able to take care of the traffic to and from the camp after the beginning of mill operations of the Utah Copper and Boston Consolidated at Garfield.

Duluth Feb. 2

Stripping operations on the Mesabi have been impeded somewhat by the intense cold of the past week or two, but in general are continuing steadily, and will be maintained through the winter. The Steel Corporation is preparing for a very large

business this year at its Hull-Rust mines, at Hibbing; and at its new Hartley, which is to be stripped for an area of 80 acres and will be one of the immense producers in a year or two. The Hartley has made records the past season for extent of stripping and low costs of this work.

G. H. St. Clair, who has been exploring the lands of the old Mesabi Iron Company, in 60-12 and 60-11, has cut ore in a number of flat veins and seams, and hopes to find considerable quantities of merchantable material. What he has cut so far has been mostly hard hematite, and quite high in iron, but in thin strata. He is hoping for soft-ore deposits, and thinks he will find them in time. This was the original development of the Mesabi range, indeed of the Minnesota region, as far back as the early 60s, and has been explored and examined many times.

Corrigan, McKinney & Co. are sinking a shaft on the eastern Mesabi, in section 3-58-15, where they have a considerable body of ore under lease. They expect to make shipments this year, but if they have the same character of ground to pass before reaching ore as their neighbors had, they will be fortunate if they hoist in 1908. The mines of Pickands, Mather & Co. in that vicinity have been especially unfortunate, and the operations of sinking shafts have been taken over by Eastern concerns especially skilled in the manipulation of deep quicksands.

Scranton Feb. 4

President John Mitchell, of the United Mine Workers, is dissatisfied with the condition of the organization in the anthracite region. He stated to National Organizer Fallon that he is unable to account for the apathy shown and will send a special staff of organizers to work up the sentiment. It is no secret that the mine workers are weaker now than at any time since the organization was first in operation in the anthracite region. Expenses have been cut down with a ruthless hand, and where some locals had a thousand members they have now less than one hundred. In fact, it is openly stated that the organization in the anthracite region is fast approaching the disappearing point. Months ago, when it was known that many had seceded, there was great dissatisfaction and members who had paid their dues regularly for years stopped payment, claiming that, as others who had benefited by the union had stopped making payment, they could not see why they should carry the full load. There is also some internal strife in the three districts, and so serious was that in the Hazleton district that President Dettery refused to stand for re-election and with him all the other officers retired. While the contending factions are fighting each other, the bulk of the members have become apathetic and suspended payment of their dues, so that the officers could not draw their salaries and were compelled to seek other employment. It is said that some of the locals are practically dead, owing to the failure to secure a quorum at the meetings. So long as there are no meetings there are no dues collected. It seems at this time as if the union will soon be a thing of the past in the anthracite region.

The consolidated annual returns to the State department of mines for the year 1906 show that 557 mine workers were killed in the anthracite region. Of these 206 deaths resulted from falls of coal and 77 from explosions. The fatal accidents for 1905 numbered 644.

Two grievances have been referred to Umpire Neill, one being from the Lehigh Valley Coal Company's miners at Duryea, protesting against excessive toppage of cars; and one from the employees of the Delaware & Hudson at Grassy island, complaining of discrimination in the distribution of cars.

A delegation of mine inspectors appeared before the committee on mining at the State capitol to oppose the Garner bill which makes mine foremen, who have a certificate of qualification, eligible to be candidates for mine inspector. The inspectors claim that foremen should not be permitted to become candidates for inspectors until after they have passed an examination before the board of examiners.

Toronto, Ont. Feb. 2

The provincial legislature of Ontario was opened Jan. 24. The speech of Lieut.-Gov. Clark contained the following reference to the policy of the Government in regard to the mining industry: "The great value of the mineral deposits in the Cobalt district is becoming more and more evident, and the future is full of promise, both to the investor in mining properties and to the people of the Province. The rights of the Province in these deposits have been kept steadily in view by my ministers, and accordingly a measure providing for the taxation of mining properties will be submitted to you for consideration."

A similar measure was promised last session, but dropped, and in view of the increased importance and influence of the mining interests it is very doubtful whether political exigencies will admit of its adoption this year.

Shipments of ore from Cobalt by the Timiskaming & Northern Ontario Railway, for the week ending Jan. 19 were as follows, in pounds:

Nipissing	236,940
O'Brien	125,600
Buffalo	140,000
La Rose	123,500
Foster	43,600
Total	669,640

In future, reports of shipments will be published weekly instead of monthly.

Great confusion has for some time prevailed owing to the similarity of the names of some of the Cobalt mining companies. Owing to complaints on this ground the provincial secretary has directed the Lawson Cobalt and the Kerr Lake Lawson companies to adopt new names.

A statement of claim in the action brought by the Florence Mining Company in the high court against the recently organized Cobalt Lake Mining Company was filed this week. A general outline of the facts of the claim has already been given, but as the case is likely to be a notable one as regards its bearing on mining law, and the question of titles to mineral property, some further points may be noted. The property embraces 20 acres of the 46 acres covered by the bed of Cobalt lake recently granted to the syndicate which organized the Cobalt Lake Mining Company, and is stated to include the only part known to be valuable. The Florence Company claims as assignee of the rights of W. J. Green as original discoverer, and asks that the grant to the Cobalt Lake Company be set aside as infringing on the statutory right acquired by Green, and as being contrary to legislation limiting the area of locations to 20 acres. The defense is that at the time of the alleged discovery by Green, the area was not open to prospectors. Cobalt lake, with other areas, was withdrawn from location by the Government on Aug. 14, 1905. On Aug. 28 following, the township of Coleman was also withdrawn. On Oct. 30 the township of Coleman was again thrown open. In January, 1906, Green applied to the Government and obtained a map and regulations showing the areas open for prospecting, which included Cobalt lake. The plaintiff's contention is that Cobalt lake, being within the boundaries of Coleman township, was thrown open with the township, and that having acted in accordance with the information issued by the Government Green obtained a statutory right to the location, which cannot be set aside by a subsequently made grant. It appears that—contrary to statements frequently made of late that no action can be taken to upset a Government grant without obtaining a fiat giving the consent of the attorney general—no such fiat is necessary unless the ground of the action is fraud or misrepresentation on the part of the holder in obtaining the grant. Where the claim, as in the present case, alleges a right existing prior to the grant, an action will lie without the consent of the Government.

Cobalt, Ont. Feb. 2

A company has been organized here recently for the operation of a sampling plant. Under present conditions producers are delayed from one to three months in marketing ore, and should the new sampling works have the confidence of all

parties, and proper financial standing, it should be successful.

The Orford Copper Company, whose works are at Copper Cliff, Ont., is arranging for steady shipment from some of the mines in the district. This company expresses a desire for high-grade ore solely. Heretofore, most of the ore has been shipped to the American Smelting and Refining Company, Perth Amboy, N. J., or the Balbach works, at Newark, N. J.

A movement is on foot for providing better transportation facilities from Toronto. At present the train leaving Toronto at 11:30 p.m. arrives in Cobalt at 2:20 p.m., or later, the next day, although the distance is but little over 300 miles. Travel is so large and increasing so rapidly that more expeditious service is most desirable.

It is announced that grading for construction of the Kerr lake branch of the Timiskaming & Northern Ontario Railroad is about to begin. This will facilitate the operation of the Kerr Lake group of mines, consisting of the Foster, University, Lawson, Jacobs, Drummond, and other mines to the south and east.

The Upper Montreal river and the Lady Evelyn sections west of Cobalt are attracting attention, and many prospectors will go in that direction. There is active mining now going on in both districts.

London Jan. 26

The Zinc Corporation has been suffering from an attack by bears this last week, for rumors have been assiduously circulated to the effect that the Potter plant, for floating the sulphides from the zinc tailings at Broken Hill, has proved a failure. Three months ago I referred to the results obtained by A. L. Queneau, in his tests of this plant; and as Mr. Queneau expressed himself satisfied with the process, it was hardly likely that it should afterward become a failure. The rumors were persistent, and the market for the shares became depressed. There is, of course, usually some grain of truth in rumors of this sort, so on inquiry as to the source of these rumors it was not surprising to hear that there had been a slight hitch, due to the use of unsuitable pumps for circulating the acid liquors. It was originally arranged to use the air-lift for these liquors, but the delivery was slow and the engineers were impatient, so they installed ordinary cast-iron centrifugal pumps as a temporary makeshift. Naturally these pumps gave out almost immediately, and the operation of the plant has had to be suspended until the air-lifts arrive. This hitch has nothing whatever to do with the eventual success of the process, though it served the bears as a base of operations.

During the copper boom in 1899 the Einasleigh Freehold Copper Mines, Ltd., was floated in London, to take over the mines of that name in North Queensland. It was soon found that the absence of railway transport militated against the success of the company, and operations were eventually suspended until such time as the means of transport were provided. The Queensland Government six months ago gave authorization to the scheme of the Chillagoe Copper Company, to extend the railway to Etheridge, by way of Einasleigh; and as this railway is now on hand, it has been thought advisable to revive the Einasleigh company. Accordingly, a new company, called the New Einasleigh Copper Mines, Ltd., has been formed. The capital is £200,000 in ordinary shares, and there are £32,000 in debentures. Of this the whole of the debentures and £72,000 in shares go to the old company as purchase price, and the new company will start with about £60,000 working capital, which has already been guaranteed. There are large bodies of ore developed and ready for shipment as soon as the railway is completed. The old company erected a smelter, which is still available, but it is not proposed to work it at present, for better terms can be obtained by shipping the ores to the Chillagoe works.

The Lloyd Copper Company, Ltd., operating at Burraga, Bathurst, New South Wales, continues to make ends meet only. During the twelve months ended June 30 last, the company treated 59,641 tons of ore and produced 970 tons of fine copper, which makes the extraction work out at 1.62 per cent. The mining, smelting and refining cost £56,323, and the sales produced an income of £75,155. Debenture interest, directors' fees, office expenses, freight, insurance, etc., amounted to about £10,000, and £4000 was written off for depreciation, leaving a balance of profit of over £4000. The company has a debenture debt of £50,000, and there are loans from the bank outstanding amounting to £35,500 secured on the copper shipments, and by metal and ore on hand. The property of the company has been extended during the year by the acquirement of an adjoining lease, which has considerably increased the ore reserves. There does not appear to be any very great promise for the future of the company, for the contents of the ore are low, and the cost of smelting must necessarily be high. In fact, if it were not for the present high price of copper, the operations could hardly be continued. The policy of the company is to keep on working vigorously as long as it can, in the hope of finding more valuable ores.

Another new Spanish copper and pyrites company has been floated in London this week. The name is the Anglo-Spanish Copper Company, Ltd., and the properties to be acquired are the San Vicente, Fronteriza and others, situated about half-way between the Tharsis mine in Spain and the San Domingos belonging to Mason & Barry, just over the border in Portugal. The orebodies are very similar to others in the same district, being of considerable width and containing 48 per cent. of sulphur, with copper contents varying from nothing to 15 per cent.

A company called Carters Deep Leads, Ltd., has been introduced to the notice of the public this week. The company has been formed to acquire leases of deep-lead properties in Victoria, Australia, especially the Lillicur. Other properties are also included.

Johannesburg Dec. 26

One of the most important letters on the labor controversy that has yet been written appeared in the local press a few days ago. It was from Mr. Raine, manager of the Village Main Reef. On this mine Mr. Creswell, the predecessor of Mr. Raine, tried the now celebrated white labor experiments. Mr. Creswell's idea was to employ the maximum number of white men. For a long time he has been telling the public here and in England, what a great success the white labor experiment was. Mr. Raine's letter completely upsets Mr. Creswell's doctrines, and proves the impossibility of using white labor for unskilled work under present conditions.

Under Mr. Creswell's management the skilled white miner's pay was cut down to a bare living wage, varying from £15 14s. 11d. to £11 12s. 4d. per month. At the present time, under Mr. Raine's management, the average wage earned by the skilled artisans is about £28 per month. As regards cost per ton mined, with a greater number of white men under Mr. Creswell, the costs varied from 25s. 4d. to 26s. 7d. per ton. Mr. Raine employs far less white men, but pays them good wages, so that his cost per ton mined is below 17s. 7d. This discussion proves the fallacy of Mr. Creswell's method of making this a white man's country. True he gave employment to a larger number of white men than any other mine, but the men were all discontented with the meager wage, and left the mine whenever they found an opening elsewhere. Consequently he was left with a band of inefficients, which probably accounts for his high costs. Mr. Raine has completely reversed his predecessor's policy. He employs far more Kafirs and less white men, but his skilled men earn good wages and are contented. Hence the great reduction of costs he has brought about.

This is probably the most certificated country in the world. No one is allowed to blast without a certificate; the manager of a mine must be the holder of a certificate; the mine surveyor must hold a government certificate; the mine overseer passes an examination for a certificate. The government has decided to certificate another class of men, and in the future the mechanical engineers of mines must hold government certificates. This certificating business certainly protects men on the Rand and handicaps the new comer in getting a position.

General Mining News

Lackawanna Steel Company—This company's statement for the year 1906 shows receipts from all sources of $29,872,279. Charges were: Operating expenses, $23,862,622; general expenses, depreciation, etc., $2,650,692; total, $26,513,314, leaving a balance of $3,358,965. The payments for new construction during the year were $2,754,488. In view of further payments for new construction, and the need of working capital, it has been deemed best to declare no dividend.

United States Smelting, Refining and Mining Company—This company is making large additions to its plant at Chrome, N. J., formerly known as the De Lamar refining plant. The addition to the refining plant, now nearly completed, will give it a total capacity of over 10,000,000 lb. per month. A converter plant is being added to the smelter. This is to be used chiefly on imported ores and mattes.

ALASKA

PRINCE WILLIAM SOUND

Galena Bay Mining Company—This company, operating at Galena bay, is preparing for active work. A dam is to be built in the spring, and machinery has been ordered for a power plant, from which electric power will be transmitted 11,000 ft. to the mine. A wire tramway 17,000 ft. long has been ordered from the A. Leschen & Sons Company, of St. Louis. The company owns several claims, including the Mullen, on Copper creek; the Warner & McClellan, on Rock creek, Kotsina; and the Nicolai. These claims all show outcrops of copper ore.

Crown Copper Company—This company has been organized to develop copper claims on Knight's island. T. D. Bradford is manager.

Knight's Island Consolidated—This company has a force at work on its copper claims, doing development work. It has bought drills and electric machinery, and is building a wharf on Dryer bay, near the mines. W. B. Hancock is manager.

Rothkrantz—On this property, Knight's island, Louis Rothkrantz, the owner, has several men doing development work.

ARIZONA

YAVAPAI COUNTY

Arizona Smelting Company—This company is keeping its smelting plant at Humboldt in continuous operation and is not able to keep up with the large amount of ore delivered to it.

Climax—A new strike is reported by the manager of this company, ex-Gov. Geo. Wolfley; it is said to be on the No. 5 tunnel level and 2 ft. of sulphide ore is reported uncovered, assaying well in gold.

Gold Basis Group—T. J. Laird, manager of this group of mines, reports the opening of a ledge of oxide ore 30 in. in width, assaying $40 per ton in gold. The mines are situated six miles south of Prescott.

Logan Copper Company—This company reports that its new working shaft has attained a depth of 40 ft. and is all in ore of a good grade, the chief value being copper, although carrying some gold.

Pick & Drill Mining Company—This company is installing two 75-h.p. boilers, a 90-h.p. Corliss engine, a 6000-gal. Worthington pump, ore-feeders and crusher in its mill near Dewey.

Yaeger Cañon Copper Company—This company has been compelled to discontinue work at its mines for a few days on account of the breaking down of its pumping plant.

YUMA COUNTY

Colonial Mining Company—The following statement is furnished through the courtesy of Louis S. Judd, manager of this company's mines, at Cinnabar, near Ehrenberg:

Our working shaft is now down 350 ft., is single compartment, with ladderway large enough for pump column and air-pipe, vertical and in the vein all the way, still sinking. No. 1 level is in 165 ft. on the vein 75 ft. below collar of shaft; at 150 ft. No. 2 level is in 270 ft. from shaft; at 250 ft. No. 3 level is in 215 ft.; all the above drifts are run to the east. A short drift was run some 65 ft. on the third level to the west. Good ore was encountered 30 ft. from shaft, but as considerable water was being developed, work was discontinued until such time as we were able to handle water economically. At 300 ft. No. 4 level is in 165 ft., also to the east, as a short drift on this level to the west showed that here also the water would cause trouble.

All levels are connected by upraises, finished as mill openings and ladderways. The vein averages about 4 ft. in width, and outcrops for something over a mile; country rock is schist. In No. 1 level same ore is encountered as shown in outcrop, carrying 7 per cent. copper, 150 oz. silver, and 30 per cent. mercury; this shoot seems continuous, same ore being cut in each level, but increasing values in silver with depth. The lower-grade ore in the vein shows little silver, and no copper, but holds fair values in cinnabar.

We have a 25-h.p. Witte gasolene hoist, 4-h.p. Witte gasolene engine driving a No. 4 Sturtevant blower, and are about to install a pump. A contract has been let to Robert Scott for a 30-ton Scott furnace, which should be in operation soon.

CALIFORNIA

AMADOR COUNTY

Central Eureka—This mine last month yielded $12,439 from 2900 tons of ore, the mill only being operated 21 days. The dividend was passed for the month, the profit being small.

Bunker Hill—From 2646 tons of ore crushed in December the yield was $18,145, or a little less than $7 a ton. The net earnings were $11,500.

Zeila—The repairs to the shaft of this mine at Jackson have been completed and the mill has started up. The mine yields 6 tons of sulphurets daily, which are handled in the chlorination works.

South Eureka—Henry Mallock, of San Francisco, has succeeded M. J. McGee as president, having purchased his interest in the mine, as well as the mineral rights in the Toman ranch property.

CALAVERAS COUNTY

Swiss Mines—At these mines, five miles from Railroad Flat, A. T. Merrell, manager, the new shaft is 210 ft. deep and a hoist is being erected. The ledge at the bottom of the shaft is 5 ft. wide and averages $6 per ton. The mines are owned by the Live Oak Mining Company.

INYO COUNTY

Montezuma—At this mine, Big Pine, F. S. Gordon, superintendent, over 2000 ft. of development work has recently been done. An air compressor and hoist will shortly be installed.

Greenwater Copper Company—This company owns the Blackbird group of copper claims, seven in number. A 200-ft. shaft is to be sunk to develop one of the ledges.

Red Boy and Saratoga—The shafts on these mines are 100 ft. deep and gasolene hoists have been put up.

Copper—Deposits of copper ore have been discovered in the southern end of the county in the Argus range, between Shepherds and Revenue cañons, north and east of Millspaugh. A number of locations have been made and some claims have been sold.

PLACER COUNTY

American and Swasey—Both these mines near Penryn have been sold to Eastern men, who will commence work upon them shortly.

Iron Mine Company—L. C. Van Trent, who sold the Dairy Farm mine to the Guggenheims, has purchased the lands of this company, embracing 1500 acres northeast of Clipper Gap and extending across Bear river into Nevada county. There is a very large body of iron ore on the land.

RIVERSIDE COUNTY

Gem Mines—The Garnet, Abrasive and Gem Company, of Los Angeles, has purchased mines in the San Jacinto mountains and is mining tourmaline, aquamarine, beryl, topaz, rose quartz, kunzite and hyalite. The mines are about 20 miles from Hemet near Lake Hemet.

SACRAMENTO COUNTY

Ellery-Laird—This mine, near Folsom, which has been closed down a few months,

is to resume operations. It is worked by a hydraulic elevator.

SAN BERNARDINO COUNTY

Kennedy Mining Company—In this property, near Oro Grande, a small vein of rich ore has been struck, which has renewed the mining activity in that section.

Allie—This mine, in Ivanpah valley, once a large producer of silver, has been sold to President Greening of the Rock Springs Castle Company and Mr. Wrenberg, by Wm. McFarlane. The mine has not been worked for many years.

Ibex District—At the new camp of Hartoun in this district, 7 miles west of Needles, a number of copper claims are being opened. The district has been virtually abandoned for some time, but the discovery of good ore in the Caprum mine by the O'Meara Company, of Salt Lake, has brought about a renewal of activity and prosperity.

Seal of Gold Mining Company—New officers have been elected for this company, which has mines in Dale district, and owns a 20-stamp mill. The new directors are H. A. Landwehr (president), A. N. Younglove (vice-president), P. T. Evans (treasurer), G. H. Moore, Edgar Sharpe, C. H. Huse and Alex. Strachan. Los Angeles interests now have control of the company.

Mining Locations—Over 350 mining locations have been recently recorded in the county, among them claims locating 42,000 acres of placer ground on the northeastern edge near the Inyo county line and in the vicinity of Greenwater district.

SHASTA COUNTY

Trinity Copper Company—At the Shasta King mine, seven miles west of Kennett, owned by this company, there is much activity. An aërial tramway is under construction from the mine to connect with the aërial tramway from the Balaklala mine to the Coram smelter.

SISKIYOU COUNTY

Dredge—A new dredging company has bonded the property along Oro Fino creek from Scott river, and will at once begin borings to test the ground.

SIERRA COUNTY

Buttes Saddle—This mine at Sierra City has been bonded by Richard Phelan to San Francisco men, who will begin work upon it at an early date.

TULARE COUNTY

Hyde Hill—On this hill, north of Porterville, are deposits of asbestos, and these have been bonded by Los Angeles men, who will work the property.

TUOLUMNE COUNTY

Harvard—The crew at this mine has been increased to 60 men, and 30 stamps are dropping.

Duleek—The company formed to work this mine is making arrangements for a resumption of operations.

COLORADO

The production of coal in Colorado in 1906 is reported as follows, in short tons: Anthracite, 68,343; bituminous, 7,548,769; semi-bituminous, 911,265; lignite, 1,670,044; small mines, 110,000; total, 10,308,421 tons. This is an increase of 1,318,790 tons, or 14.7 per cent., over the previous year. The production of coke was 1,113,643 tons; there were 3376 coke ovens in operation, and 1076 men employed in coke plants.

The total number of men employed in and about the coal mines was 12,030. The number of casualties during the year was:

	Number.	Per 1000 Employed.
Fatal	85	7.06
Non-fatal	160	13.30
Total	245	20.36

The average coal mined per employee at the mines last year was 857 tons.

Victor Fuel Company—This company's statement for the half-year ending Dec. 31 is as follows: Gross receipts, including miscellaneous, $1,242,620. Charges were for operating expenses, $914,569; depreciation, etc., $67,685; taxes and fixed charges, $72,143; total, $1,054,397, leaving a surplus of $188,223. The coal mined was 839,518 tons, an increase of 133,116 tons over the previous half-year. The coke made was 41,638 tons, a decrease of 7165 tons.

BOULDER COUNTY

Blue Bird—W. Smith Jennings, of New York, has purchased this silver property, near Nederland. A. H. Kidney, Nederland, Colo., is superintendent.

Golden Age—John L. Gordon, of Denver, and associates, have purchased this mine at Jamestown, and have also taken over the Standard mill, on Jim creek, near Springdale, which is to be remodeled. J. V. Sybrandt, Jamestown, is superintendent.

Enterprise—At the annual meeting held at Boulder, Howard H. Carpenter was elected president and general manager, and J. E. Carpenter, secretary and treasurer. Property is located at Eldora.

CLEAR CREEK COUNTY

Annie May—This group in Georgetown district has been sold to Denver people by Grubb & Jones for $15,000. Machinery is to be installed. E. E. Grubb, Georgetown, Colo., is manager.

Stemwinder—Manager J. M. Shaller, of Georgetown, has taken a lease on the Kavergne mill, near Dumont, Colo., and will run it on Stemwinder ores as soon as machinery is installed.

Colorado Quito—Pittsburg, Penn., people have taken over the Quito group; new machinery is being installed and buildings erected. C. M. De Camp, Idaho Springs, is manager.

Bellevue-Hudson—John A. Holmberg, of Denver, has secured under lease and bond this group, near Georgetown, option calling for $100,000 within three years.

Banner Consolidated—A deal has been made, involving $250,000, whereby Louisiana capitalists have acquired interests in the Banner properties. Heavy developments are planned. F. H. Nye, Idaho Springs, is manager of the property in Freeland district.

GILPIN COUNTY

Next President—Henry J. Stephens, of Denver, has purchased this property in Gregory district, the consideration being reported as $50,000. English people were the owners.

Federal—Eastern people have taken a lease and bond in the sum of $22,500 on this mine, in Russell district. W. E. Campbell, Russell Gulch, is manager.

Fifty Gold Mines Corporation—The annual election, held in Denver, resulted as follows: President, G. A. Lewis, Naugatuck, Conn.; secretary, F. N. Totman, Central City, Colo.; general manager, O. B. Thompson, Black Hawk, Colorado.

O Be Joyful—Denver and Eastern people are interested in a lease and bond, and will install machinery. Louis Roy, Central City, Colo., is superintendent.

LAKE COUNTY—LEADVILLE

New Monarch—The Winnie shaft is making a record for itself that bids fair to be a first-class second to the famous Little Jonny mine. Last summer in a body of low-grade ore 20 ft. wide, a streak 10 in. wide was opened in a stope to the east, and since then work has been carried on steadily, developing it, and from this work, on an average, 1½ carloads have been shipped monthly, giving net returns of $10,000 to the car. Development work has been carried on to the north in a large porphyry dike, and shortly after the new year a body of ore 5 ft. wide was opened that gave smelter returns of 36 oz. gold, 77 oz. silver, and 8 per cent. copper. Sufficient work has been done on the ore channel to prove it in place. The ore is an oxide, and in color is a dirty brown. The Cleveland shaft lies to the north of the Winnie, and is down 500 ft. In a drift at the north end of the shaft a body of ore 11 ft. wide was opened recently that runs 1½ oz. gold, 25 to 30 oz. silver, and 10 per cent. lead. Sinking was started on this shaft at the beginning of the week, and another lift of 125 ft. will be done, when drifting will be started to catch the ore-shoot of the Winnie.

Mammoth—A year ago the striking of mineral in this property, Big Evans gulch, created some excitement among local men on account of it being virgin territory and outside of the regular ore zone. At a little over 550 ft. a body of iron was encoun-

tered, and about 100 ft. deeper a body of sulphide running high in silver was opened, and with it a heavy flow of water which the company was not prepared to handle; after a temporary close-down to admit of heavier pumps being installed, work of sinking was again resumed, and after going a few feet dolomite sand was struck to such an extent that it clogged the valves of the pumps, and the shaft was again lost; to obviate this a ring was cut around the shaft to hold the sand, but it was only a partial success, and after several attempts to sink, the company closed down to permit of heavier machinery being installed. After dickering for a number of months to raise sufficient money to carry on the work, the company lost its lease. Practical mining men consider the ground valuable, so James A. Shinn succeeded in securing an option on the ground and interested Boulder capital in taking hold. Work has again been resumed on the claim.

Eclipse—This property, south of Empire gulch, is located outside of the regular mineral zone, but this fact has not kept the lessees from opening a good body of ore in the shaft. The ore was first struck a little below 100 ft., and as the shaft went down the orebody widened until today it is 6 ft. wide at the bottom of the shaft; sinking will continue until the bottom of the ore is reached. The average value of the ore is about $30 per ton, and enough of it is being taken out in sinking to meet the running expenses.

Mansfield Shaft—Twenty years ago this shaft, Iowa gulch, was sunk to a depth of 700 ft., but the inflow of water was so heavy that the company abandoned work, and the shaft is now full of water to within 20 ft. of the surface. The Keystone Mining Company, at present working the Helena, in the same section, has secured a lease on the Mansfield, and work has been started.

ROUTT COUNTY

Steamboat Springs Commercial Club—This club has been organized for the legitimate advertising of that section of Routt county, and with the following officers: President, M. E. Houston; secretary, C. E. Mitchell; treasurer, R. G. Pupke.

Hahns Peak—Montreal, Canada, people are interested with E. A. Hewitt, of Denver, and have taken an option on a group of copper mines on Farwell mountain, near Hahns peak. They have taken up a reservoir site, proposing to furnish electric power to various enterprises. It is reported that the company proposes to erect reduction works of 100 tons daily capacity.

SUMMIT COUNTY

Colorado Consolidated Electric Company—This company, which last year took over all of the mining and power property of the Gold Pan Company, has now given an option on all of its holdings to Ben Stanley Revett, the dredge owner and placer operator. The option covers all water rights, ditches, flumes, pipe lines, manufacturing plant, electric power, lighting plant and machine shops. It is Mr. Revett's intention to supply his dredge on the Reliance property, in French gulch, with electric power, and also, to operate the proposed new dredges on the Blue and Swan rivers by electricity.

Blue Flag—Robert A. Niles, who has had charge of this company's affairs since its organization, has resigned his position as superintendent, and is succeeded by Charles M. McGrew. President Krisman has paid a visit of inspection to the property and has given instructions to confine all efforts to the further development of the mine for the balance of the winter.

Senator—Work on this mine is being carried on under the supervision of M. M. Howe, manager, and a force of twenty miners is busy taking out ore and piling it ready for shipping in the spring.

Wonderful London—This property under the same management is being well developed at depth. A force of 15 men is employed here and the main shaft is now 500 ft. down.

Puzzle Gold Dust—This property has resumed active operations. W. A. Walker of Mt. Pleasant, Ohio, has been installed as manager, and has with him as superintendent John B. Nelson, an old-time Summit county foreman who knows the property thoroughly. A body of lead-zinc ore has been struck in the upraise above the main tunnel level.

Wellington Mines Company—This company is employing a force of 25 men in the mine breaking ore.

Maize—This company is doing vigorous work on Rock creek, north of Dillon, on the Boss and other lode claims. The main tunnel has now intersected the old Boss vein at a depth and a body of silver ore has been opened up.

INDIANA

GIBSON COUNTY

Coal Land Development—Willam Howe and Joseph Martin, of Chicago, who recently bought 500 acres of coal land near Bicknell, have sunk a shaft which penetrates a vein of good bituminous coal 6 ft. 10 in. thick. Options are being taken on 4000 acres of coal lands adjoining.

SULLIVAN COUNTY

Fatal Explosion — Ten miners were killed in a mine explosion near Clinton, Jan. 14. There is a difference of opinion as to the cause of the explosion and a committee from the legislature has been appointed to make an investigation. There have been 21 miners killed in Indiana mines during the present year.

VIGO COUNTY

Southern Lead and Coal Mining Company—This company has incorporated at Terre Haute to mine coal in Indiana and lead in Illinois. The company will build coking ovens also.

INDIAN TERRITORY

CHOCTAW NATION

The Missouri, Kansas & Texas Railway is making survey for an extension of the spur from the Wilburton branch to the McAlester Coal and Mining Company's mines at Buck, southeast past another new slope now being opened, through the J. F. McMurray lease, where the Indian Coal and Mining Company is opening a slope, and to a new slope opened by the Milby & Dow Coal Company. A branch is also being surveyed east from this line through the Central Coal and Coke Company's two leases, where it is prospecting with the expectation of opening a mine or two.

Wilburton Oil and Gas Company—This stock company, composed of Wilburton citizens, is drilling for gas at Boiling Springs, on Gaines creek, on the Wilburton branch of the Missouri, Kansas & Texas, about six miles west of Wilburton. Alexander Anderson, of Krebs, I. T., who has the drill contract, states that the well is now down 1000 ft., and has a strong flow of gas. He expects to strike the sand he is after at 1500 ft. depth.

MARYLAND

ALLEGHANY COUNTY

Cumberland Basin Coal Company—New York capitalists, represented by W. De L. Walbridge, president of the American Coal Company, have acquired control of this company. The purchasers intend to reorganize the company and thoroughly develop the properties, which comprise about 10,000 acres of land about 20 miles from Cumberland, Md. The lands are said to contain from 4,000,000 to 5,000,000 tons of the famous Big-Vein coal and a large area of the smaller vein. The new owners propose to construct a branch railway four miles long to connect the mines with the George's Creek & Cumberland Railroad in order to provide direct transportation to tidewater at Baltimore. The Cumberland Basin Coal Company has common stock of $1,000,000 and first mortgage 5 per cent. bonds for $500,000. In reorganizing it is stated there will be issued $500,000 of 6 per cent. preferred stock (cumulative after two years) and $500,000 of common stock. Baltimore capitalists interested in the company are expected to retain a large interest in the new bonds.

MICHIGAN

HOUGHTON COUNTY—COPPER

La Salle Copper Company—The organization of this company has been completed, with the election of the following directors: Alexander Agassiz, Rodolphe

L. Agassiz, C. C. Douglas, F. W. Hunnewell, Thomas L. Livermore, James McNaughton and Quincy A. Shaw, Jr. The transfer of the Caldwell property has been completed by the issue of La Salle stock in exchange for that of the Caldwell. That property was formed of lands owned by the St. Mary's Mineral Land Company, the Shelden-Douglas interests and a few small blocks of land owned by the Calumet & Hecla Company. The new company will also take over the Tecumseh, as soon as the exchange of stock can be completed.

The Tecumseh property will henceforth be under the direction of James McNaughton, superintendent of the Calumet & Hecla, but R. D. Edwards, who has been in charge of Tecumseh, and who is directly responsible for the successful opening of the Kearsarge lode, will remain in actual charge of the operating end.

ONTONAGON COUNTY—COPPER

Victoria—Additional mill facilities now being installed should enable 400 tons of rock to be treated daily, which would mean in the neighborhood of 2,000,000 lb. of copper annually. Lack of labor has handicapped development, but with a recently acquired force of men a shaft will be sunk 3500 ft. east of the present one, and a crosscut will be driven from the 19 level south to intercept at depth a promising-looking vein. It is expected that this crosscut will pass through five distinct veins and if any of them show signs of value extensive drifting will be done. Instead of restricting work to one vein the management, now that conditions permit, will make an intelligent examination of the company's resources. The veins of Ontonagon county are not so distinctly defined or clearly mapped out as those of Houghton county, and it is quite possible that the Victoria will, with its 2200 acres, be found to have values as yet unsuspected. With the completion of the addition to its crushing equipment the company should be able to extend its prospecting work and increase its production materially.

IRON—MARQUETTE RANGE

Cleveland Cliffs—This company has just bought the lands of the Deer Lake Company, in Marquette county, some of which lie on the iron-ore formation of the Marquette range, and will be explored. The Deer Lake Company was one of the first to engage in pig-iron making on the Upper Peninsula, and its lands were originally covered with timber. The Cleveland Cliffs Iron Company is securing large tracts in northern Michigan, and is by far the chief landholder in that region, much of its acreage being in the district where iron may be looked for. It is certain that these lands will be developed as the company has opportunity, and it is probable that some of these developments will result as favorably as those which it has carried out during the past year or two near Princeton.

MINNESOTA

IRON—MESABI RANGE

Republic Iron and Steel Company—This company has recently bought three new properties on the Mesabi range—the Onondaga, from the Onondaga Iron Company, of which G. G. Hartley and C. A. Congdon, of Duluth, are the principal stockholders; the Mariska, from the Mariska Iron Company, and the Monica, from the Monica Iron Company. The principal stockholders of the two companies are A. B. Coates, of Virginia and A. M. Miller, Jr., of Duluth. The description of the Onondaga mine is the westerly 25 acres of the N. ½ of the S. W. ¼ of Sec. 4-58-17; the Mariska mine is the W. ½ of the S. E. ¼ of Sec. 24-58-17, and the Monica mine the N. E. ¼ of the N. W. ¼ of Sec. 9-58-16. Each of these three properties contains approximately 500,000 tons of bessemer ore, and they are all underground propositions. The royalty on the Onondaga property is 75c. per ton, and the royalty on the other two properties is 55c. per ton. Shaft sinking on each of these three properties will be started inside of 30 days, and the company expects to ship from each of them at least 25,000 tons next season. Shipments from the Onondaga mine will be over the Duluth, Missabe & Northern, and from the Monica and Mariska mines over the Duluth & Iron Range.

IRON—VERMILLION RANGE

Shagawa—Developments at this mine—the famous section 30-63-11, Vermillion range—have not been satisfactory, and the shaft, which is now down about 500 ft., has revealed practically nothing more than was known through earliest drill explorations, conducted for the Clergue interests four years ago. The shaft has been designed to go to the depth of about 1500 ft., where drills showed a soft formation that seemed to promise ore, but it is now in very hard formation and progress is exceptionally slow and costly. What the result of the present situation may be is hard to say.

MONTANA

The reports of the United States Assay Office in Helena for the year 1906 show a gratifying increase over those of the year preceding. For the year 1906 the total receipts of the office were $2,431,755 as against $2,391,279 for 1905. For the last year the receipts from Montana were: Gold, $2,176,434 against $2,103,342, for the preceding year.

BUTTE DISTRICT

Boston & Montana—The company is cutting a station at the 1700-ft. mark in its West Colusa mine, and will resume sinking to the 2000 as soon as the station set is placed. It is sinking the new shaft on the Leonard to the 1400, and is 60 ft. below the 1200. Since the first of the month it has been hampered by a shortage of coal, coke and railroad cars, with the result that its ore production will be about 20,000 tons less than that of December.

Coalition—The company expects to finish its 710-ft. tunnel between the collar of the Tramway shaft and the Rarus shaft, in a short time. The opening will strike the Rarus 210 ft. below the mouth. All ore hoisted through Rarus will be run through the tunnel, which will save hill work for locomotives, and all timbers used in the mine will be sent through this opening. Electric motors will be used in the tunnel. The shaft on the Minnie Healey is 1200 ft. deep, and is going deeper. Ore shipments from the property aggregate about 1100 tons a day.

Davis-Daly Estates—So far this company has not extracted a pound of ore, but is rapidly developing some of its claims. It is crosscutting south of the 500-ft. station in the Smokehouse, sinking on the Colorado, Silver King and Mt. Moriah, and driving the crosscut south of the 1800-ft. station of the Original. The face of the latter is about 1300 ft. from the station, and is supposed to be nearing the Thomas veir. The Colorado shaft is about 660 ft. deep, and that on the Mt. Moriah 400. The one on the Silver King is a misfit on an incline, and will never do for extensive operation.

Butte-Milwaukee—Butte-New York is the holding company of Butte-Milwaukee, and is composed principally of New York men, Leo Schlessinger, Harry Mittenthal and W. L. Moyer among them. The company has bought the Narrow Gauge mine, which has a record as a producer, and is sinking a deep shaft on the Colonel Sellers with a view of developing this claim and the Bird, which adjoins it on the east. Options on several other claims in the immediate vicinity of the old group have been secured. The company is mining the Pollock, one of its assets, and is extracting considerable silver ore from it.

LEWIS & CLARKE COUNTY

Ruby Gulch—A. W. Martin, of Helena, has secured an option on the Ruby Gulch properties in the Zortman district for $7,500,000. There is an immense deposit of cyanide ore, with a 300-ton mill on the property. An 18-day run of this mill returned over $60,000, the entire run averaging $15 per ton. It is understood that an Eastern syndicate has the property under consideration and has sent an expert to make a thorough examination. There are two large parallel veins from 60 to 150 ft. wide, from which ore can be mined at small expense.

Eglanol Company—This company, composed of Helena and Boston capitalists, which for three years has been running a drainage tunnel 6300 ft. long in its placer grounds near Lincoln, has just completed the work and made tests. The tunnel goes under the gravel bed to a depth of about 55 ft. and taps the rich ground that has been surface worked. The ground tested at the mouth of the tunnel is rich, and

there is 400 acres that can be thoroughly worked to depth through this tunnel.

Spring Hill—A notable discovery has been made in the Spring Hill properties, three miles south of Helena. These properties are located on the contact between lime and granite, which is well defined, running for 20 miles east and west. The present strike in these properties, owned by the Pittsburg & Montana Company, is a vein of free gold milling ore 30 ft. wide, which from smelter tests averages $17, and in many portions has run higher. This property was purchased about two years ago by the Pittsburg Company, and was developed and worked for the iron ore desired for flux for the company's smelter at Butte. The presence of free-milling ore was not suspected until it was discovered by a lessee a short time ago. The Spring Hill is directly west of the Whitlach-Union mine, from which over $5,000,000 was taken years ago above the 400-ft. level. This mine was purchased two years ago by the Whitlach Company and developed to greater depth. General Manager Frank L. Sizer, of the Whitlach, has secured an option on the Spring Hill properties, and it is expected that the Whitlach Company will take over the properties and increase the capacity of its mill to work the Spring Hill ores with those of the Whitlach. A tunnel now under way by the Whitlach will be continued so as to strike the Spring Hill vein at a depth of 300 ft., the two properties being on opposite sides of the hill separating Grizzly and Oro Fino gulches.

NEVADA

ESMERALDA COUNTY—GOLDFIELD

Hayes-Monnette—M. J. Monnette states that his lease on the Mohawk yielded $4,400,000. Its extent was a third of a claim, measuring 700 ft. in length and 373 ft. in width. The largest daily output was $60,000 and the largest monthly yield was in October last, when the sum of $1,300,000 was received from the smelters. The ore averaged $400 per carload. The lease was owned by G. H. Hayes, J. W. Smith, Harry Benedict and M. J. Monnette, and each of them netted over $900,000. They have all invested largely in other mines in the field and have already been successful in making good strikes in the Esmeralda and Goldfield-Columbia mines.

Mohawk—The Goldfield Consolidated Mines Company, owner of the Mohawk, has taken possession from the lessees and is preparing a site for an immense ore-house. Surveys are also being made for spur tracks from the railroad. The Mohawk shaft is being re-timbered and fitted up for a long campaign of hard work. When these operations are completed a large force of miners will be set to work taking out ore.

Frances-Mohawk—This lease on the Jumbo Extension mine is rapidly improving in prospects. A 300-ft. shaft, which has reached a depth of 175 ft., is being rapidly sent down. A 60-h.p. hoist is being erected and preparations are progressing for a compressor and drill equipment.

Nevada-Goldfield—A fresh oreshoot has been struck on the 500-ft. level. The ledge is 10 ft. in width and averages from $20 to $30 per ton. The ore is free milling.

NYE COUNTY—MANHATTAN

Butler—A body of milling ore has been cut in the main tunnel which averages $30 per ton for a width of 6 ft. It has been drifted on for a distance of 60 ft. The ore is of the same character all the way and can all be profitably mined and milled. The manager is preparing to sink a winze on the ledge, so as to be able to start extraction on a large scale with as short a delay as possible.

Kewanas—A main shaft has been started to develop the ledges cut in the surface-prospecting shafts. The shaft is situated close to what is believed to be a continuation of the famous Combination vein. Sinking is progressing at the rate of 4 ft. per day and will be continued to 200 ft. before cross-cutting to the ledge is undertaken.

Wolftone Extension—The recent stormy weather has interfered with surface operations, but sinking is being pursued as rapidly as possible, with the view of picking up the rich Wolftone vein, which gives every indication of extending into this mine.

Indian Camp—The shaft has been sunk a distance of 208 ft. and is now in a calcareous schist formation, which is believed to be the hanging wall of the ledge.

Toquima Copper—A fresh contract has been let for the sinking of the shaft to a depth of 250 ft. Copper values are improving as sinking progresses. A well defined orebody has been cut in a crosscut at the water level and it is proposed to open out on it from the 250-ft. level.

NYE COUNTY—REVEILLE

Nevada Smelting and Mines Corporation—This company is installing two hoists of 25 h.p. on its property at Reveille and is preparing to operate its claims on an extensive scale. The ground is being developed by means of two vertical shafts about 700 ft. apart. One of these shafts is down 150 ft. and the other has attained a depth of about 75 ft. Both shafts will be sunk to a depth of 400 or 500 ft. before crosscutting is begun. The Reveille property contains large bodies of high-grade silver-lead ore.

NYE COUNTY—CHLORIDE

There has recently been a rush to Chloride, which was formerly known as the Danville silver camp, and was first prospected in 1867. The Chloride field is about 25 miles square, stretching from Dibbin's Summit on the north to Glover creek, on the south, from the Morey mountains, on the east, to the crest of the Monitor range on the west, facing Fish Springs valley. The camp itself is 75 miles northeast of Tonopah. A large number of locations have been made during the past month, and there is every prospect that many of the old producers will be reopened. Railroad facilities will probably be provided during the current year.

NEW JERSEY

MORRIS COUNTY

Richard—The head house of No. 5 shaft on this mine, near Dover, was destroyed by fire Jan. 31, damaging the hoist and pumps badly. There were 150 men at work, but all escaped through other shafts. The mine is owned by the Thomas Iron Company.

OREGON

BAKER COUNTY

Bonanza—The new owners of this old mine are preparing to begin work on the property. Albert Geiser, formerly in charge of the mine, has been made manager. The mine is in the Blue mountains above Sumpter, 30 miles west of Baker City.

Oregon Placer and Power Company—This company has been incorporated with $350,000 capital, to operate placers and build a power plant. The incorporators are N. Berkeley, James A. Howard and J. J. O'Dair. The office is in Baker City.

JOSEPHINE COUNTY

Harms Mining Company—A company by this name has bought several mining properties, and promises to work them on a considerable scale. G. R. Harms, of Cincinnati, O., is president; E. N. Wilson, 20 Broad street, New York, secretary. The mines office is at Ashland, Oregon.

LAKE COUNTY

There is some excitement over a discovery of gold at Windy Hollow, near Warner lake. The country is volcanic, and the gold values are said to have been found in rhyolite dikes. A number of claims have already been taken up.

PENNSYLVANIA

ANTHRACITE COAL

Lehigh Valley—This company has rebuilt the Exeter breaker, near Pittston, which was destroyed by a windstorm.

Erie—The Avoca breaker of this company was destroyed by fire last week within 24 hours after it had been ordered shut down by Mine Inspector Johnson, for repairs. The washery also caught fire and was destroyed, the total loss being about $100,000.

Mount Jessup Coal Company—The breaker of this company at Jessup, nine miles north of Scranton, was destroyed by fire, Jan. 28. It prepared the coal from three separate operations, and until a new breaker is built about 900 men and boys will be idle. The breaker was valued at

$75,000 and was built about eight years ago. It is thought that the fire was due to the carelessness of the night gang. The directors decided this week to rebuild.

Philadelphia & Reading Coal and Iron Company—This company, having stripped sufficient surface on the 12-acre Mammoth vein tract secured near Ellangowan last year, will begin blasting and hoisting out the coal with steam shovels. The Mammoth vein varies in thickness from 30 to 100 ft., and it is the best quality of anthracite. Twelve acres of surface earth have been scooped away to an average depth of 20 ft., thus laying bare the vein. The work of excavating has been in progress about two years, and the job having been nearly finished, the work of taking out coal will be commenced this week. An advantage in this sort of mining is that there is but little or no waste, a.. no pillars need be left standing to support the surface as in underground mining. The coal will be transported in mine cars to the Ellangowan colliery breaker and there prepared for market. Another extensive coal stripping belonging to this company is at Turkey Run, and a still more extensive one will soon be begun on the hillside south of the Pennsylvania railroad, near Shenandoah.

BITUMINOUS COAL

Pittsburg Coal Company—It has been understood for some time that there was considerable friction in the management of this company. It is now reported that Francis L. Robbins will resign as president, and will be succeeded by William Flinn, of Pittsburg. It his not been possible, however, to secure either confirmation or denial of the report.

SOUTH DAKOTA

The annual report of N. Treweek, State mine inspector, for 1906, states that 3720 men were employed in the mines during the year, not including placer miners and prospectors. The number of accidents was as follows:

	Number	Per 1000 Employees
Fatal	7	1.88
Non-fatal	14	3.76
Total	21	5.64

The non-fatal accidents include only those of a serious nature.

LAWRENCE COUNTY

Branch Mint—The eight-hour day has been granted at this property, which lies in and near the camp of Galena. Change went into effect Feb. 1, and the announcement met with much enthusiasm. About 40 men in all are employed, some of them working on the cyanide annex of the stamp mill and others opening up ore reserves. Last week a new ledge running $10 to the ton and better was encountered in the 300-ft. level.

Homestake—The semi-annual report of this company is now out and shows excellent conditions. Total receipts for the six months were $2,791,215 and the operating expenses were $1,993,609. Of the net earnings $665,200 were paid in dividends and the remaining $142,352 was added to the surplus. One charge to operating expenses was $201,850, expended on the construction of the slime plant. The average value of the ore at this time is a little better than it has been, $3.82, and the number of tons of ore milled during the six months 720,216.

PENNINGTON COUNTY

Dakota-Calumet — This company is working over 60 men at the property, east of Hill City, and has opened up a body of copper ore, increasing in value with depth. It is the intention of the company so to develop the ground that it will be possible to operate the large smelter some time this spring. A. C. Overpeck, of Hill City, is superintendent.

Bengal Tiger—After a lapse of more than 20 years, work on this once famous ground s to be resumed. Hoist, whim and pumps have been leased, lumber has been ordered for the shaft-house and men are at work cleaning up the works.

Aarondale Wolfram—This company has just been organized, with Gus Miller, of Pittsburg, as president, Josephine Aaron, secretary, and R. J. Truax, manager. The company owns eght claims, has ordered a hoist and will proceed to develop the deposits of wolframite.

UTAH

IRON COUNTY

Jennie Gold Mining Company—This company is operating at Gold Springs and has in process of erection a mill of 40 tons daily capacity. Some large orebodies have been developed during the past year. A shipment taken from 5 ft. of the best portion of a 12-ft. vein gave returns of 25 oz. in silver and $60.60 in gold.

JUAB COUNTY

Annandale—A new compressor is being installed at this property, which was secured recently under an option by F. Augustus Heinze.

Colorado—This company has cut an important orebody near the side-lines of the Beck Tunnel Consolidated. The find was made on the 250 level. The mine is controlled by Jesse Knight, of Provo, Utah.

Tintic Ore Shipments—Last week shipments amounted to 162 carloads, the contributing mines being: Ajax, 3; Beck Tunnel, 7; Bullion Beck, 8; Centennial Eureka, 56; Eagle & Blue Bell, 4; Eureka Hill, 12; Gemini, 5; Godiva, 6; Grand Central, 4; May Day, 7; Mammoth, 20; Ridge Valley, 4; Scranton, 6; South Swansea, 1; Swansea, 3; Tintic Iron, 9; United Sunbeam, 1; Victoria, 4; Yankee Consolidated, 3 cars.

Lower Mammoth—The two electric hoists ordered for this mine some time ago are being installed. Equipment has been provided to handle a daily output of 100 tons of ore.

SUMMIT COUNTY

Park City Shipments—The output of ore from Park City mines last week amounted to 2,659,160 lb., the contributing mines being: Daly Judge, 1,212,000; Little Bell, 75,300; Silver King, 947,000; Daly West, 400,000; Crescent, 24,860 pounds.

WEST VIRGINIA

FAYETTE COUNTY

Stuart—An explosion of gas occurred in this mine, near Thurmond, owned by the White Oak Fuel Company, on the afternoon of Jan. 29. The shaft-house was badly wrecked, and the fans stopped, so that it was some time before rescue work could be started, and it was then found impossible for men to descend any distance. On the fourth day after the accident details of the explosion were still lacking. Owing to the fumes of gas in the mine a full investigation has not been possible, but there seems no doubt that 20 or more bodies await recovery, while 64 have already been recovered. This will put the death list above any previous mine explosion in the history of West Virginia. The investigations of the State authorities, coroner, and of the mine officials, are proceeding indepeadently without waiting for the completion of the rescue work, which is being pushed vigorously.

PRESTON COUNTY

Preston County Coke Company—This company has recently been incorporated with a capital stock of $200,000 and contemplates developing coal lands and manufacturing coke. The property to be developed comprises about 6000 acres. It is proposed to construct 100 coke ovens, to be ready for operation by July 1, and to enlarge the plant later by the construction of 200 additional ovens, developing its capacity to about 700 tons per day. The coal production is expected to be about 1200 tons per day. Approximately $100,000 will be expended during the coming summer for construction work and equipment, and an additional $100,000 will be expended when the coke plant is enlarged. The main office of the company will be at Uniontown, Penn., and a branch office at Masontown, W. Va. Officers of the company are H. C. Greer, Newcastle, Penn., president; F. C. Keighley, vice-president; I. W. Semans, treasurer; L. W. Fogg, secretary, all of Uniontown, Pennsylvania.

TUCKER COUNTY

Davis Coal and Coke Company—A despatch dated Feb. 4 says: Thirty-five or 40 miners, the majority of them foreigners, are supposed to be dead in an explosion today at mine No. 25 of the Davis Coal and Coke Company at Thomas. Five miners who were just entering the mine when the explosion occurred were taken out dead, so it is believed all the miners already in the mine have been killed.

Coal Trade Review

NEW YORK, Feb. 6

The coal trade in the West remains measurably dependent on the railroads. There is a great deal of complaint still about transportation conditions, and in some of the larger markets stocks on hand are being used up, so that supplies depend on daily deliveries. Bad weather has tended to make the conditions worse, especially in the Northwest.

In the East cold and snow have tended to make the trade more active, on the one hand, and to interfere with deliveries, on the other. A heavy snow, extending over nearly all the Eastern territory, closes the week, and will make trouble for the railroads. The demand for steam coal continues heavy everywhere.

The Dominion Coal Company has closed a new contract with the New England Gas and Coke Company for the delivery of 25,000 tons of slack coal per month, for three and one-half years, at a price substantially above that of the last contract. Shipments will continue, as heretofore, from the mines at Sydney, Cape Breton, to the coke plant at Revere, near Boston.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Jan. 26 were as follows, in short tons:

	1905.	1906.	Changes
Anthracite	396,950	379,473	D. 17,477
Bituminous	2,729,489	2,775,956	I. 46,467
Coke	972,273	971,233	D. 1,040
Total	4,098,712	4,126,662	I. 27,950

The increase so far this year has been 0.7 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Feb. 2 were 99,606 tons.

Coal shipments over the roads in the Ohio Coal Traffic Association for the 11 months ending Nov. 30 were, in short tons:

	1905.	1906.
Hocking Valley	3,396,595	3,545,906
Toledo & Ohio Central	1,431,821	1,657,005
Baltimore & Ohio	1,806,267	1,766,680
Wheeling & Lake Erie	2,450,863	2,110,446
Cleveland, Lorain & Wheeling	1,904,125	1,935,708
Zanesville & Western	936,380	1,063,591
Toledo Division, Penna. Co.	1,686,902	2,044,072
Lake Erie, Alliance & Wh'ling	721,845	733,398
Marietta, Col. & Cleve	.....	13,460
Total, net tons	14,334,798	14,870,266

The total increase in 1906 was 535,463 tons, or 3.7 per cent.

Receipts of coal and coke at Chicago, with shipments from the city to interior points, were as follows for the 11 months ending Nov. 30, in short tons:

	Received.	Shipm'ts.	Balance.
Anthracite	1,353,026	486,175	866,851
Bituminous	9,498,719	2,443,217	7,055,502
Coke	313,602	238,201	75,401
Total	11,165,347	3,167,593	7,997,754
Total, 1905	9,859,964	2,717,380	7,142,584

The balance represents approximately the consumption in the city. Bituminous receipts were made up as follows: Pennsylvania, 818,172 tons; Ohio, 767,600; West Virginia, 833,050; Indiana, 2,618,552; Illinois, 4,461,345 tons.

New York Feb. 4

ANTHRACITE

The blizzard which is at present raging throughout the East has to a considerable extent congested traffic and made deliveries somewhat uncertain. The demand for coal has been fairly active and supplies of domestic sizes have been quite good, with the exception possibly of chestnut. Cars have been in fair supply; during the last day or so the railroads have taken the men from the coal docks to work on removing snow, and this has made local shipments difficult. Small steam sizes still remain practically out of the market. Prices remain unchanged at $4.75 for broken, $5 for egg, stove and chestnut. Small steam sizes are quoted nominally at $3 for pea, $2.25@2.50 for buckwheat, $1.50 for rice, $1.40 for barley; all f.o.b. New York harbor shipping points.

BITUMINOUS

The Atlantic seaboard soft-coal trade shows little activity, although it is anticipated that the present storm will strengthen the market slightly by interfering with deliveries. Prices are quoted for fair grades of steam coal at $2.65@2.70, f.o.b. New York harbor shipping ports. There is some talk with regard to contracts and some little business is claimed to have been closed up but this is probably only skirmishing before the real contracting time begins, as it is a question whether the through-freight rates, on which the principal prices are based, have as yet been definitely decided upon.

Trade in the far East is absorbing considerable coal. Trade along the Sound is fairly active, and Sound barges are at present more available. New York harbor trade is dull, but it is not apparent that there are any large quantities of coal standing at tidewater ports. All-rail trade is fairly active. Transportation from mines to tide is slow and irregular. Car supply is poor and the improvement which was noted in the early part of January on cars from West Virginia seems to have ceased. In the coastwise vessel market there is talk of some ice in the Chesapeake and Delaware, which will interfere with vessels. Freight rates are quoted from Philadelphia to Boston, $1 and discharge, and to the Sound 85c. and discharge; both include the loading and discharging clause.

Birmingham Feb. 4

Coal operations are still halted only by the transportation facilities. Mine operators are still clamoring for better service by the railroads.

State Mine Inspector J. M. Gray reports that, with a few of the larger concerns yet to be heard from, the production for the past year will show a decrease as compared with 1905. Railroad conditions during the latter part of the year were worse than anticipated, reducing the coal production.

Edward Flynn, former president of the United Mine Workers of America, in Alabama, has taken up his new work as assistant State mine inspector, succeeding M. M. Kuffner, resigned. J. R. Kennamer has been elected Mr. Flynn's successor in the miners' organization.

Chicago Feb. 4

Continued cold weather has benefited both bituminous and anthracite business. Illinois and Indiana mines have curtailed shipments to Chicago greatly to the benefit of the trade. In consequence of this condition and the increased demand the market is firmer for Western bituminous.

Illinois and Indiana prepared sizes are strongest; lump and egg bring $2.25@3.50; run-of-mine sells at $1.75@2.25, and screenings are somewhat weak at $1.30@1.60.

Coals from east of Indiana are firmer, owing to restricted supply. Smokeless run-of-mine is still strong at $3.40; smokeless lump and egg are weak, the standard price of $4.30 being cut to $4.05. Hocking is recovering from the slump and brings $3.25@3.50. Youghiogheny is improving and sells for $3@3.15.

The anthracite market is active for both city and country business. Chestnut continues in great demand; small sizes, egg and stove are in good supply.

Cleveland Feb. 5

The stocks of coal on hand have about been exhausted, and this territory is now relying principally upon shipments direct from the mines. The demand for mine-run steam coal is increasing with the continuance of the cold weather. The price of Ohio is now about $1.25 at mines. Pennsylvania coal of the same quality is selling on the basis of $1.15 at mines. Ohio slack has moved up to $1.20 at mines, due, largely, to the short supply. In Pennsylvania slack some of the dealers are quoting $1.10 at mines, but this looks like an extreme price. The market is probably at 95c.@$1 at the mines. Strictly domestic coal has held steady at $2.30 at the mines, Massillon, for selected lump.

The coke market has been strong all through. There has been an improved demand for spot shipment. The market for foundry is holding about steady at $4@4.25 at the oven for 72-hour, but furnace coke is in strong demand, and some of the ovens quote $3.75 as the minimum, with a very slight difference between that and foundry coke.

Some of the smaller lake shippers have taken boats for 1907, paying the old rates of 30c. to the head of the lakes, and 40c. to Lake Michigan. This fixes the rates for the bigger shippers. The latter are holding off until the railroads have decided whether they are going to raise the rail rates from mines to lake ports.

Pittsburg Feb. 5

Coal—There is a good supply of railroad cars, but weather conditions have interfered with transportation and prices are firmer, sales being made on a basis of $1.15 to $1.20 for mine-run coal at the mine. A good barge-stage during the past few days permitted shipments to the Cincinnati and Louisville markets. The tonnage was not large, as the rivers have been navigable for most of the time during the past six or eight weeks. Only four large tows got out with a trifle less than 1,000,000 bush. The pools and harbor are crowded with empty coal boats, barges and flats.

Coke—Deliveries have been bad during the past week or two, due to the severe weather, and as a result spot prices of standard Connellsville coke are higher. Furnace coke for February is quoted at $3.65@3.75, and for the first six months at $3.10@3.25. For deliveries extending through the year contracts may be made at $3@3.15. Foundry coke for spot shipment brings $4.25@4.50, and for the first six months, $4@4.25 is quoted.

Foreign Coal Trade

Feb. 6

Exports of coal and coke from the United States for the full year are reported by the Bureau of Statistics as follows:

	1905.	1906.	Changes.
Anthracite	2,229,983	2,216,969	D. 13,014
Bituminous	6,959,265	7,704,850	I. 745,585
Total coal	9,189,248	9,921,819	I. 732,571
Coke	599,253	765,190	I. 165,937
Total	9,788,501	10,687,009	I. 898,508

The exports do not include coal bunkered, or sold to steamships engaged in foreign trade. For 11 months of 1906 this coal was 4,712,087 tons; the December figures are not yet ascertained.

The coke exported went chiefly to Mexico and eastern Canada; the distribution of the coal was as follows:

	1905.	1906.	Changes.
Canada	6,964,630	7,533,346	I. 568,716
Mexico	927,170	1,084,319	I. 157,149
Cuba	564,385	689,833	I. 125,448
Other W. Indies	300,776	319,839	I. 19,063
Europe	101,277	81,734	D. 19,543
Other countries	331,010	212,748	D. 118,262
Total	9,189,248	9,921,819	I. 732,571

The exports to Europe were chiefly to Italy; those to other countries, to South America. The exports to Canada—70.5 per cent. of the total in 1906—were, in detail, as follows:

	1905.	1906.	Changes.
Anthracite	2,187,450	2,176,342	D. 11,108
Bituminous	4,777,180	5,357,004	I. 579,824
Total	6,964,630	7,533,346	I. 568,716

There was a small decrease in anthracite, but a considerable gain in bituminous coal.

Imports of coal and coke into the United States for the year are reported as follows, in tons:

	1905.	1906.	Changes.
Great Britain	94,600	106,771	I. 12,171
Canada	1 331,292	1,427,731	I. 96,439
Japan	41,956	11,996	D. 29,960
Australia	184,426	191,758	I. 7,332
Other countries	569	6,251	I. 5,682
Total coal	1,652,843	1,744,507	I. 91,664
Coke	86,091	128,461	I. 42,370
Total	1,738,934	1,872,968	I. 134,034

Of the coal imported in 1906 there were 32,357 tons classed as anthracite. Some Nova Scotia coal comes to New England ports, but the bulk of the imports of coal are on the Pacific coast. The coke is chiefly from British Columbia, though a little comes from Germany.

Iron Trade Review

NEW YORK, Feb. 6

There is little change from last week in the iron and steel markets. New business is still rather quiet, but specifications on contracts are being pressed and the mills are all fully occupied. A good deal of business in structural material is being held back, owing to difficulty in arranging for deliveries. In certain lines, especially plates and rails, premiums are being offered to secure material during the first half of the year.

The severe storms of the present week will probably interfere with the railroads to some extent, and delay deliveries of material that is much wanted.

Pig-Iron Production—The completed figures for pig-iron production given by the American Iron and Steel Association for the past two years are as follows, in long tons:

	1905.	1906.	Changes.
Foundry & forge	5,837,174	5,714,492	D. 122,682
Bessemer pig	12,407,116	13,840,518	I. 1,433,402
Basic pig	4,105,179	5,018,674	I. 913,497
Charcoal iron	352,928	433,007	I. 80,079
Spiegel & ferro	289,983	300,500	I. 10,517
Total	22,992,380	25,307,191	I. 2,314,811

The total increase was 10.1 per cent. Some comment on these figures will be found on another page.

Iron and Steel Exports—Exports of iron and steel, and of machinery, from the United States for the full year are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1905.	1906.	Changes.
December	$13,986 261	$14,800,508	I. $ 814,247
Year	142,930,514	172,555,588	I. 29,625,074

The increase for December was 5.8 per cent.; for the year it was 20.7 per cent. The leading items of export for the year were as follows, in long tons:

	1905.	1906.	Changes.
Pig iron	49,221	83 317	I. 44,096
Billets, ingots & blooms	237,738	192,616	I. 54,878
Bars	51,870	87,655	I. 35,785
Rails	295,023	328,036	I. 33,013
Sheets and plates	75,096	110,654	I. 35,558
Structural steel	84,234	112,555	I. 28 321
Wire	142,609	172,764	I. 30,155
Nails and spikes	47,165	59,492	I. 12,327

The larger exports of rails in 1906 were 122,348 tons to South America; 65,937 tons to Canada; 33,136 tons to the West Indies; 26,878 tons to Mexico.

Iron and Steel Imports—Imports of iron and steel, including machinery, into the United States for the full year are valued by the Bureau of Statistics as below:

	1905.	1906.	Changes.
December	$2,488,336	$3,986,659	I. $1,498,323
Year	26,401,283	34,827,132	I. 8,425,849

The increase for December was 60.2 per cent.; for the year, 31.9 per cent. The more important items of the imports for the year were, in long tons:

	1905.	1906.	Changes.
Pig iron	212,466	379.828	I. 167,364
Scrap	23,731	19,091	D. 4,640
Ingots, blooms, etc	14,642	21,337	I. 6,695
Bars	37,294	35,793	D. 1,501
Wire-rods	17,616	17 999	I. 383
Tin-plates	65,740	56,983	D. 8,757

The increase in pig iron was 78.3 per cent.; but the total quantity was still small, as compared with total production here.

Iron Ore Movement—Exports and imports of iron ore in the United States for the full year are reported as below, in long tons:

	1905.	1906.	Changes.
Exports	208,017	265,240	I. 57,223
Imports	845,651	1,060,390	I. 214,739

Most of the exports were to Canada. The greater part of the imports came from Cuba.

Imports of manganese ore for the year were 257,033 tons in 1905, and 221,260 tons in 1906; a decrease of 35,773 tons. The imports were chiefly from Russia, India and Brazil.

Baltimore Feb. 5

Imports of spiegeleisen for the week were 996 tons; of ferro-manganese, 1068 tons; of ferrosilicon, 321 casks. One cargo of manganese ore, 6250 tons, arrived from India. Receipts of iron ore were two cargoes, 10,000 tons, from Cuba. Other receipts included two cargoes of iron pyrites, 6600 tons, from Spain.

Birmingham Feb. 4

The announcement that the railroads handling the pig iron and kindred traffic in the southern territory, had applied for a postponement of the date for putting on the advance of 25c. per ton on freight rates from this district to the Ohio river, and that the Interstate Commerce Commission had granted the same, gives relief to manufacturers. The advance was to have gone into effect Feb. 1. There is nearly 60,000 tons of iron still in the yards, as the result of the railroads being unable to handle promptly traffic offered. The railroads are doing a little better in the way of handling tonnage. It is expected, therefore, that a large portion of the accumulated iron will have been moved by the end of the month.

Some excellent orders for iron are still being received. The aggregate business handled during January just passed was very good. Prices are still firm. Even with delivery stipulated toward the last of the year, no iron is selling in the Birmingham district under $18 for No. 2

foundry. Much attention is being given to improvement in production. Some contracts were made recently by iron companies for ore supplies during the entire year. In other instances, further development was started looking to a better supply of ore, coal, coke, and limestone.

Chicago Feb. 4

The iron market continues steady, with no important change in conditions or prices. Sales of contract iron for the last half are abating somewhat. Spot sales are increasing, though not rapidly, and they are not so large in comparison to contract sales as they were a month ago. Northern iron is more in demand and greater in supply for quick-delivery lots, and Southern shows signs of easing in price for such lots, despite the advance in the freight rate.

Coke is in fairly good supply, with the price holding up firmly for prompt deliveries and a little easier on contracts.

Cleveland Feb. 5

Iron Ore—The situation, in the main, has not changed during the week. Some extensive improvements are to be made in Lake Superior dock equipment, that the ore may be handled more speedily. Another change is the intention of the American Ship Building Company to erect a large dry dock at the head of the lakes. This will reduce the delay to vessels damaged in the upper lake region. Few sales of ore have been made and these have been at ruling prices. No further chartering of boats has been reported.

Pig Iron—The pig-iron trade has not changed much, except there is a little heavier buying of Southern iron by consumers in this territory for second-half delivery. It is apparent, too, there is more iron coming out both from Northern and Southern furnaces than was anticipated would be the case. These lots range from 100 to 200 tons and have been frequent enough to take care of the urgent needs of many consumers. It seems a good deal of iron is to be forthcoming from these sources and will be available during the second quarter. At the same time it is apparent second-quarter material is in good demand. Southern foundry No. 2 is being sold at $18.50@19 Birmingham, to which is added the new freight rate of $4.35 to make up the Cleveland price. Northern No. 2 is selling at $22@23 for second-half delivery and at $25.50@26 for immediate shipment.

Finished Material—The shortage of scrap is being felt in this territory both in the pig-iron trade and in the bar-iron trade. The supply of the latter is comparatively short and the demand is good. Consumers are shifting to bar steel, wherever this can be done. The supply of billets has been rather light, for immediate shipment, but the future market shows an easier tendency and the trade is considerably relieved. The demand for the staples, plates, shapes and bars is still good and there is some buying in quantity for delivery during the last half of the year. Sheets are also strong.

Philadelphia Feb. 6

Pig Iron—The pig-iron market is still in an unsettled condition, partly because of the fact that offers from buyers for large deliveries for the third quarter of the year have not yet been definitely acted upon. The rumor is current in this market that we are approaching safer conditions as to pig iron and that if buyers will only have patience and keep cool they will be able to obtain as much iron as they will need for the second- and third-quarter delivery. But little spot iron is called for, nearly everything relating to late summer delivery. Those furnaces which have forge iron for summer delivery are refusing to sell at anything but present figures. The storm has upset shipments and considerable trouble may be anticipated, as a good many customers are about out of iron. Quotations for No. 2 X foundry are given at about $27, though prices vary. Gray forge is quoted at $23; basic at $25.50 and English No. 3 at $23; Scotch on dock at $25.

Steel Billets—Some business is being done in steel billets at $34 and negotiations are said to be pending for deliveries on a basis of $33. Forging steel has sold at $37.

Bars—Delivery of bar iron is held up everywhere. The stores are pretty well supplied with bars and no immediate trouble will arise from that source. Quotations for best refined iron are 1.93½; steel bars sell at about the same, but are quoted at 1.83½, but this means nothing.

Sheets—Most of the sheet selling is at premium prices and card rates are nominal. About the only buyers heard of are the smaller ones, who want sheet as fast as they can get it.

Pipes and Tubes—The consumption of pipes and tubes continues heavy and the mills are reported as far oversold.

Plates—While plates have not nominally advanced, premium prices control all business. The necessities of large consumers are such that it is not a question of price but of accommodation.

Structural Material—There will be a rush for structural material very soon, if some current rumors mean anything. No change in prices is announced.

Steel Rails—The mills of this State are quietly booking orders, but they are for the most part from buyers who need only small quantities.

Scrap—The scrap market is dead for the week. Nothing can be moved. Prices are working a little in favor of buyers. No. 1 steel scrap is nominally $18.50; No. 1 yard scrap $20, machinery scrap $22, wrought-iron pipe $16; old iron rails are $27, nominally.

Pittsburg Feb. 5

Careful scrutiny of the situation proves that the bearish views being circulated as to the future of the iron and steel market have no foundation in fact. These ideas can be traced to Wall street, where the inability of the railroads to command funds at their own pleasure has caused disquiet. The stability of the iron and steel market for the next nine months or more does not depend upon such factors. It is quite true that there is a considerable tonnage of business on the books of steel companies, and assumed to be actual business, which would be canceled, or fail to bring specifications at the proper time, but the percentage of the total business reported, upon which actual orders and specifications have been received, is larger than ever before.

With the last advance, one point, merchant steel pipe is five points, or about $10 per net ton, above the market in the early part of October.

Pig Iron—Transactions are rather light, as there is much bearish talk going the rounds. In some districts, particularly in the East, and possibly to some extent in southern Ohio, prices for prompt iron are easier, but in no case have second-half prices shown any easier tone, and the reduction in the spread between prompt and late delivery would make the situation sounder. The Bessemer Furnace Association, comprising the majority of the Valley furnaces making bessemer pig iron, outside of the Snyder interest, reports that it has disposed of 80 per cent. of its output for the current year. A portion of this is on long-time contracts, subject to special price adjustment from time to time, the balance being in outright sales. For second-half delivery the association and the other large interest are firm on the quotation of $21.50, Valley, for bessemer, basic being about 25c. less. No. 2 foundry for second half is held at $21.50@22, Valley, while prompt remains at $25@25.50. A line of 1000 tons was closed out in various lots at $25, Valley, and since then sales of carload and larger lots, have been made at $25.50. Gray forge is quoted at $20.85@22.85, Pittsburg, according to delivery. Southern iron for second half remains firm at $18.50, Birmingham, equal to $23.35, Pittsburg.

Steel—Deliveries are fairly good on old contracts, and there is some steel being offered, but not by local mills. The Pittsburg basis can still be quoted at $29.50 for bessemer, and $32 for open-hearth, but it is possible that $29 for bessemer and $30 or $31 might be done, f.o.b. some Ohio mills. Plates are firm at 1.70c., and merchant steel bars at 1.60c.

Ferro-Manganese—The market continues weak, but the opinion is expressed in some quarters that the weakness is due to manipulation. Prompt ferro brings $73 to $74, while for delivery beginning in July, as low as $70 has been quoted.

Brussels, Belgium Jan. 20

Pig-iron production in Belgium for the full year was as follows, in metric tons:

	1905.	1906.	Changes.
Foundry iron	98,170	101,430	I. 3,260
Forge iron	206,309	226,900	I. 20,591
Bessemer, basic, etc.	1,006,641	1,103,130	I. 96,489
Total	1,311,120	1,431,460	I. 120,340

At the close of the year there were 42 blast furnaces in Belgium, of which 38 were in blast and two idle. The average number in blast during the year was 37, showing an output of 38,688 tons per furnace in blast for last year.

Dusseldorf, Germany Jan. 29

The Stahlwerks Verband—the German Steel Syndicate—reports the shipments from the various works in the combination for the full year as follows, in metric tons:

	1905.	1906.	Changes
Billets, blooms, etc.	1,910,634	1,861,924	D. 48,710
Rails and fastenings	1,631,464	1,935,847	I. 304,383
Shapes, etc	1,673,266	1,936 172	I. 262,906
Total	5,215,364	5,733,943	I. 518,579

The total increase last year was 9.9 per cent. The export shipments are not yet made public.

Cartagena, Spain Jan. 19

Iron and Manganiferous Ores—Messrs. Barrington & Holt report for the week: Shipments were five cargoes, 10,290 tons dry ore, to Great Britain; two cargoes, 9350 tons dry ore, to Rotterdam; one cargo, 4225 tons dry ore, to Philadelphia; 23,865 tons in all. There is nothing fresh to report in local iron-ore market. Shipments have been very active. We are unable to quote any prices, having no ore disposable.

Metal Market

NEW YORK, Feb. 6

Gold and Silver Exports and Imports.
At all United States Ports in December and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Dec. 1906	$1,729,194	$ 7,588,623	Imp. $5,859,429
" 1905	2,668 532	4,028,881	" 1,360,349
Year 1906	46,560,397	155,550 766	" 108,990,369
" 1905	46,794,467	50,293,405	" 3,498,938
Silver:			
Dec. 1906	5,486,094	4,122,324	Exp. 1,363,770
" 1905	8,196,149	4,692 746	" 3,503,403
" 1906	59,036,340	44,350,896	" 14,685,444
1905	57,513,102	35,939,135	" 21,573,967

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.
For week ending Feb. 2 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$ 1,000	$ 65,740	$106,538	$ 34,170
1907	1,345,585	418,439	2,014,663	311,534
1906	1,053,875	188,770	9,478,903	171,023
1906	23,897,883	349,885	3,480,103	78,668

Exports of gold for the week were to the West Indies; of silver to London. Imports, both gold and silver, for the week were from Mexico and South America.

The joint statement of all the banks in the New York Clearing House for the week ending Feb. 2 shows loans $1,097,837,500, an increase of $11,852,100; deposits, $1,076,720,000, an increase of $9,708,400, as compared with the preceding week. Reserve accounts show:

	1906.	1907.
Specie	$192,492,100	$197,800,300
Legal tenders	83,986,300	84,013,800
Total	$276,478,400	$281,814,100
Surplus	$11,127,625	$12,634,100

The surplus over legal requirements shows a decrease of $2,928,700, as compared with the previous week.

Specie holdings of the leading banks of the world on Feb. 2 are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$197,800,300
England	$171,247,480	.....	171,247,480
France	529,185,600	$197,238,400	726,424,000
Germany	162,660,000	54,220,000	216,880,000
Spain	77,025,000	122,170,000	199,195,000
Netherlands	27,705,500	28,800,500	56,506,000
Belgium	16,420,000	8,210,000	24,630,000
Italy	160,980,000	23,800,500	184,780,500
Russia	590.255,000	23,675,000	613,930,000
Aust.-Hungary	232,950.000	60,220,000	293,170,000
Sweden	19,980,000	.....	19,980,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to Jan. 24.:

	1905.	1906.	Changes.
India	£ 1,615,700	£ 296,510	D. £ 1,319,190
China	.....	.....	.....
Straits	.....	.....	.....
Total	£ 1,615,700	£ 296,510	D. £ 1,319,190

Receipts for the week were £2000 from New Zealand, £14,500 from Australia and £152,000 from New York; a total of £168,500. Exports were £72,500 to India.

Indian exchange has been a little easier, but the Council bills offered in London were all taken at an average of 16.09d. per rupee. Considerable purchases of gold in Australia on Indian account are reported.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.53	$0.55
Peruvian soles and Chilean	0.48	0.49
Victoria sovereigns	4.85⅓	4.87⅓
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Jan.-Feb.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	February.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
31	4.84¾	68⅛	31⅛	4	4.84¾	69	31⅛
1	4 84¾	68⅛	31⅛	5	4.84⅛	68¼	31⅛
2	4.84⅛	69	31⅛	6	4.84⅛	68⅛	31⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Daily Prices of Metals in New York.

Jan.-Feb.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
31	25 @25⅜	24⅝ @25	106¼	43¾	6.00	6.70 @6.80	6.55 @6.65
1	25 @25⅜	24⅝ @25	107 3/16	42	6.00	6.70 @6.80	6.55 @6.65
2	25 @25⅜	24⅝ @25	.....	42	6.00	6.70 @6.80	6.55 @6.65
4	25 @25⅜	24¾ @25	107⅝	42⅜	6.00	6.70 @6.80	6.55 @6.65
5	25 @25⅜	24¾ @25	107⅜	42⅜	6.00	6.70 @6.80	6.55 @6.65
6	25 @25⅜	24¾ @25	107 1/16	42¼	6.00	6.70 @6.80	6.55 @6.65

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotation on spelter are for ordinary western brands; special brands command a premium.

Copper—The market has ruled extremely quiet, and no transactions of any consequence were reported. Nevertheless the undertone remains very strong, and prices at the close are quoted 25@25⅜ for Lake copper; 24¾@25c. for electrolytic in ingots, cakes and wire bars; 24¼ @24½ for casting copper.

The favorable statistical position of standard, which shows a decrease for the second half of January of 3500 tons, had the effect of strengthening the London standard market considerably, and the close is cabled as £107 13s. 9d. for spot, £108 13s. 9d. for three months'.

Refined and manufactured sorts we quote: English tough, £110; best selected, £114 10s.; strong sheets, £123 10s.@£125.

Exports of copper from New York for the week were 663 long tons. Our special correspondent reports the exports from Baltimore at 1311 long tons.

Copper Wire—The base price of copper wire, No. 0000 to No. 8, is 27¼@27½c. per pound.

Copper Sheets—The base price of copper sheets is 30c. per pound.

Tin has somewhat recovered from its recent depression, and at the close the quotations are cabled from London as £129 15s. for spot, £192 for three months'. Spot supplies in this market are rather scarce, and command a premium, 42⅜ being asked at the close, while more distant deliveries can be gotten at about 42c.

Statistics for the month of January show an increase in the visible supplies of 1700 tons.

Lead—The quotation remains unchanged at 6c., New York.

The London market for lead has remained rather steady, the quotations during the entire week being £19 12s. 6d. for Spanish lead, £19 15s. for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs on Feb. 6 as follows: Lead is firm, but quiet. Missouri lead is selling at 6.07½@6.12½c., according to brand and delivery.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 19, that the price of pig lead has been 97 reales per quintal, silver being paid for at 13.50 reales per ounce; exchange 27.17 pesetas to £1. On current exchange the price of lead was equal to £18 14s. per long ton, f.o.b. Cartagena. Exports of desilverized were 30 tons to Hamburg, 300 tons Amsterdam and 65 tons to Marseilles; of argentiferous lead, 623 tons to London and 347 tons to Marseilles.

Spelter—The scarcity of near-by spelter still continues and buyers have to pay a premium for such delivery. Although a fair business has been done for future months, prices remain unchanged and close at 6.70@6.80 New York, 6.55@6.65c. St. Louis.

The foreign spelter market was very much depressed owing to large offerings, and it closes weak at £25 17s. 6d. for good ordinaries, £26 2s. 6d. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 19, that exports for the week were 3100 tons blende to Bordeaux, 800 tons blende to Antwerp, and 500 tons calamine to Stettin.

Zinc Sheets—The base price is $8.40 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 pounds.

Antimony—Although the foreign market does not show any signs of weakening, efforts have been made in this market to depress prices, however, without much success. Still, the numerous offers from so many sides have had the effect of scaring off buyers, so that the market at the moment is utterly lifeless. Quotations are nominal at 23¼@24c. for outside brands; 24@24¾c. for Hallett's; 25@25¾ for Cookson's.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size and terms of order. For small quantities prices are 50@65c., same delivery.

Platinum—Demand continues strong and prices high. Unmanufactured platinum is quoted at $38 per oz. For good scrap $31.50@32 is paid.

Quicksilver—There is no change. New York prices are $40.50@42 per flask of 75 lb., according to size and conditions of order. San Francisco prices are $39@40 per flask for domestic orders, and $37@38 for export trade. The London quotation is £7 per flask, with £6 18s. 9d. asked by jobbers.

Aluminum—Prices are steady and demand good. Prices for ton lots, or over, are: No. 1, over 99 per cent. pure metal, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are 1 to 3c. higher, according to size. Rods, according to size, are 1c. per lb. up, over the price of ingots. Granulated metal is 2c. per lb. over ingots.

Imports and Exports of Metals

Copper Exports and Imports—Exports of copper from the United States for the full year are reported as below by the Bureau of Statistics of the Department of Commerce and Labor, in long tons, of 2240 lb. each:

	1905.	1906.	Changes.
Great Britain	27,208	24,597	D. 2,611
Belgium	2,231	2,891	I. 660
France	33,305	36,028	I. 2,723
Italy	7,054	8,829	I. 1,775
Germany and Holland	105,023	110,839	I. 5,816
Russia	8 223	4,252	D. 3,971
Other Europe	11,285	11.277	D. 8
Canada	1,348	1,864	I. 516
China	35,688	2,202	D. 33,486
Other countries	7,433	235	D. 7,198
Total metal	238,798	203,014	D. 35,784
In ores and matte	5,835	5,319	D. 516
Total	244,633	208,333	D. 36,300

The total decrease was 14.8 per cent. If, however, we omit the shipments to China in both years, the decrease was only 2814 tons in 1906. The actual quantities of ore and matte exported in 1906 were 47,619 tons, of which 36,700 tons went to Canada, 10,600 tons to Mexico, and 319 tons to other countries. Contents are estimated on the basis of values.

Imports into the United States of copper and copper material for the full year, with re-exports of foreign metal, are reported as follows; the figures give the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico	38.212	14.147	52,359
Canada	13,794	4,612	18,406
Great Britain	10,067	.....	10,067
Japan	3,025	.....	3,025
South America	.....	1,960	1,960
Other countries	13.723	1,283	15,006
Total imports	78,821	22,002	100,823
Re-exports	699	83	782
Net imports	78,122	21 919	100.041
Net imports, 1905	70,938	22,368	93,306

The total increase in the net imports in 1906 was 6735 tons, or 7.3 per cent. The actual tonnage of ores and matte imported from Mexico this year was 97,779 tons; from Canada and Newfoundland, 75,115; from South America, 10,715 tons.

The exports and the net imports compare as follows:

	1906.	1906.	Changes.
Exports	244,633	208,333	D. 36,300
Net imports	93,306	100,041	I. 6,735
Excess, exports	151,327	108,292	D. 43,035

This shows for 1906, as compared with the previous year, a decrease of 28.4 per cent. in the excess of exports.

Tin Imports—Imports of tin into the United States for the full year were as follows, in long tons:

	1905.	1906.	Changes.
Straits	18,503	15,452	D. 3,051
Australia	601	937	I. 336
London	19,399	26,424	I. 7,025
Holland	458	553	I. 95
Other Europe	820	1 486	I. 666
Other countries	53	250	I. 197
Total	39,834	45,102	I. 5,268

The increase in 1906 over the preceding year was 13.2 per cent. Most of the tin received from Great Britain was Straits tin.

Lead Imports and Exports—Imports of lead into the United States in all forms, with re-exports of imported metal, are reported as below for the full year, in short tons, of 2000 lb. each:

	1905.	1906.	Changes.
Lead, metallic	5,720	11,763	I. 6,043
Lead in ores and base bullion	92 657	72,371	D. 20,286
Total imports	98,377	84,134	D. 14,243
Re-exports	59,456	47,247	D. 12,209
Net imports	38,921	36,887	D. 2,034

Of the total imports in 1906, there were 66,756 tons from Mexico, 9257 tons from Canada and 7890 tons from Europe. Exports of domestic lead were 285 tons in 1905, and 326 tons in 1906; an increase of 41 tons.

Spelter Exports and Imports—Exports of spelter from the United States for the full year were 5516 short tons in 1905, and 4670 tons in 1906; a decrease of 846 tons. Exports of zinc dross in 1906 were 15,887 short tons; this article was not reported separately in 1905. Exports of zinc ore were 27,630 tons in 1905, and 24,750 tons in 1906; a decrease of 2880 tons.

Imports of spelter were 521 tons in 1905, and 2204 tons in 1906; an increase of 1683 tons.

Antimony Imports—Imports of antimony into the United States for the full year were as follows, in pounds:

	1905.	1906.	Changes.
Metal and regulus	5,737,891	7,900,194	I. 2,162,303
Antimony ore	1,976,694	2,247,131	I. 270,437

The increase in metal and regulus last year was 37.7 per cent.; in ore, 13.7 per cent.

Nickel Imports and Exports—Imports of nickel ore and matte into the United States for the full year were 13,451 tons in 1905, and 15,156 tons in 1906; an increase of 1705 tons.

Exports of nickel, nickel oxide and nickel matte for the year were 9,550,918 lb. in 1905, and 10,620,410 lb. in 1906; an increase of 1,069,492 lb. last year.

Platinum Imports—Imports of platinum into the United States for the full year were 7145 lb in 1905, and 11,463 lb. in 1906; an increase of 4318 lb. last year.

Quicksilver Exports—Exports of quicksilver from the United States for the full year were 1,009,446 lb. in 1905, and 484,151 lb. in 1906; a decrease of 525,295 lb. last year.

Aluminum Exports—Exports of aluminum and manufactures thereof from the United States for the full year were valued at $290,777 in 1905, and $364,251 in 1906, an increase of $73,474 last year.

Missouri Ore Market

JOPLIN, Feb. 2

The highest price paid for zinc was $52.50 per ton, but the assay-basis price only reached $47@49 per ton of 60 per cent. zinc, prices for the extra choice bins of concentrate being made without regard to an assay basis. The average price, all grades, is $45.78, a decrease on account of heavier shipments of silicate concentrate.

The highest price reported paid for lead concentrate was $88 per ton, on a basis of $85 per ton of 80 per cent. lead. The average price was $84.44, on account of increased shipments of lower grades.

A peculiar feature of the week's market was that a basis price of $49 per ton was paid for zinc concentrate carrying a heavy iron penalty. This brings up the fact that a deduction of $1 per ton for each unit in excess of 1 per cent. is preposterous, and brings to mind the further fact that this inequality was originated by the first organization of mine owners.

Following are the shipments of zinc and lead concentrate for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,459,530	799,810	$115 290
Joplin	2,457,560	292,210	70,171
Alba-Neck City	1,366,000	.....	33,467
Galena-Empire	1,158,020	100,890	31,500
Duenweg	835,390	143.510	25,730
Badger	993,090	17,970	25,092
Oronogo	663,760	7,470	16,163
Aurora	854,810	.....	14,322
Spurgeon	409,300	49 530	10,152
Prosperity	256,490	73,640	9,157
Granby	320,000	57,000	6,452
Carthage	234,110	.....	5,735
Sherwood	140,780	14,190	4,045
Baxter Springs	62,760	61,650	3,978
Springfield	64,750	.....	1,554
Peoria	87,630	.....	1,402
Zincite	46.650	4,170	1,318
Diamond	54,990	.....	1,292
Totals	13,465,620	1 622,040	$376.820
Five weeks	56,288,770	7,720,320	$1,614,318
Increase over 1906	5,423,590	665,870	187,603

Zinc value, the week, $308,327; five weeks, 1,289,861
Lead value, the week, 68,493; five weeks, 324,457

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.58
February	47.37	.....	February	72.83	.....
March	42.68	.....	March	73.73	.....
April	44.63	.....	April	75.13	.....
May	40.51	.....	May	78.40	.....
June	43.83	.....	June	80.96	.....
July	43.25	.....	July	74.31	.....
August	43.56	.....	August	75.36	.....
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Wisconsin Ore Market

PLATTEVILLE, Feb. 2

The month of January ended with the price of zinc ore on the rise. Buyers were out early this week. Sixty per cent. zinc was sold at $49@50; the highest price paid for zinc ore during the week, as far as reported, was $54.50. The tonnage produced was one of the largest in the history of the camp, running nearly 3,000,000 lb. The increase was noticeable all over the district, but mostly in the southern portion.

The camps of the district loaded ore for the week ending Feb. 2, as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	799,100	.....	.....
Linden	323 170	.....	.....
Benton	319,640	.....	.....
Cuba City	178,400	.....	.....
Highland	132.000	60,000	.....
Mineral Point	96,080	.....	47,480
Rewey	61.000	.....	.....
Livingston	48.000	.....	.....
Galena	44,000	.....	.....
Total for week	2,001,390	60,000	47,480
Year to Feb. 2	7,731,165	357,890	95,480

A considerable part of the ore sold was not loaded, owing to bad weather and shortage of cars.

Chemicals

NEW YORK, Feb. 6

Copper Sulphate—The market remains steady and unchanged. Prices remain as last week, $7.25 per 100 lb. for carload lots, and $7.50 for smaller parcels.

Exports of copper sulphate from the United States for the full year were 19,367,179 lb. in 1905, and 18,732,159 lb. in 1906; a decrease of 635,020 lb. last year.

Nitrate of Soda—Messrs. Mortimer & Wisner, of New York, give the following statistics of nitrate for the United States, as of date Feb. 1, in long tons:

	1906.	1907.	Changes.
Stocks, Jan. 1	13,100	13,050	D. 50
Imports, January	26,600	21,960	D. 4,640
Total supplies	39,700	35,010	D. 4,690
Deliveries, January	27,900	30,231	I. 2,331
In store, Feb. 1	11,800	4.779	D. 7,021
Afloat for U. S.	90,500	72,500	D. 18,500

Tonnage afloat includes all cargoes due to arrive by May 15 next. Current quotations for 95 per cent. are $2.40 per 100 lb.; $2.45@2.47½ being paid for 96 per cent. nitrate.

Heavy Chemicals—Imports of heavy chemicals into the United States for the full year were, in pounds:

	1905.	1906.	Changes.
Bleaching powder	104 919,462	105,221,371	I. 301,909
Potash salts	307,054.130	321,220,320	I. 14,166,190
Soda salts	29,358,397	22,556,100	D. 6,802,297

Exports of acetate of lime for the year were 70,816,382 lb. in 1905, and 72,154,382 lb. in 1906; an increase of 1,338,000 lb. last year.

Phosphates—Exports of phosphates from the United States for the full year were, in long tons:

	1905.	1906.	Changes.
Crude	934,940	904,214	D. 30,726
All other	22,865	31,999	I. 9,134
Total	957 805	936,213	D. 21 592

The larger exports in 1906 were 272,785 tons to Germany; 149,489 tons to Great Britain; 116,357 tons to France; 93,744 tons to Italy.

Sulphur—Imports of sulphur and pyrites into the United States for the full year were, in long tons:

	1905.	1906.	Changes.
Sulphur	83,201	72,559	D. 10,642
Pyrites	515,722	597,347	I. 81,625

Estimating sulphur contents of pyrites at the usual figure, the total sulphur imported was 289,489 tons in 1905, and 311,498 tons in 1906; an increase of 22,009 tons.

Mining Stocks

NEW YORK, Feb. 6

The general stock market is still rather weak and halting, with a good deal of liquidation going on. It is soft and rather narrow. Mining stocks, especially coppers, have been brighter and more active than any other class of securities. The prices, while not advancing, have been generally steady.

Boston Feb. 5

After a lull and a short period of depression mining shares show a better tone. The banks are better disposed toward this class of securities in their loans, recognizing that brokers' business is largely in mining stocks. This may be due, in part, to the formation of the Copper bank, in New York. The increase in the Quincy mining dividend will also tend to stimulate trading, although the street is slow to recognize this fact. Quincy stock has been the feature in local speculation. On Thursday last week it jumped from $121.50 to $132.50, and today it bounded to $145. The declaration of a $4.50 dividend is at the rate of $18 for the year, and the stock is now below $150 per share. The Boston interests wanted $5, and the rate declared was a compromise with the New York interests, who wanted $4. Trinity has been more normal in fluctuations, although active. It varied from $39 to $37, during the week, closing above $38. Utah spurted $3 to $74, on New York buying, reacting to $72. Osceola and Tamarack have been quiet. The former closes about the same as a week back, at $166, and Tamarack is up $6 to $150.

Allouez and Centennial spurted late last week on light trading, showing that the market is bare of these stocks. Isle Royale broke sharply, touching $27.50. Subsequently it rose to $33, with the final today $1.50 below this. This company has purchased additional territory near its No. 6 shaft. Franklin moved up sharply today, touching $28.50. There is a vague report that the La Salle is looking to take over this company and to exchange some of its treasury stock for Franklin. Calumet & Hecla has bought additional property with a view, it is said, to provide a mill site for the La Salle.

N. L. Amster has floated a new Montana property with 80,000 shares, par $5.

Colorado Springs Feb. 1

The stock market on the local exchange has shown more activity and better prices this week. The output from the mines in the Cripple Creek district exceeds $1,000,000 for January. Gold Sovereign, Portland and Work, each made a substantial advance during the week, but Work dropped back on today's call. The remainder of the list has held its own fairly well. A new stock on the mines list that is receiving some notice, is Index, which has several thousand shares to its credit for the week. The annual meetings of the Isabella and Portland companies, which are to be held on Feb. 4, are probably affecting the price of these stocks.

STOCK QUOTATIONS

NEW YORK Feb. 5	
Name of Comp.	Clg.
Alaska Mine	1½
Am. Nev. M. & P. Co.	3⅝
Amalgamated	112
Anaconda	276⅛
Balaklala	12⅛
British Col. Cop.	10¼
Buffalo Cobalt	3⅛
Butte & London	2⅜
Butte Coalition	35
Butte Cop. & Zinc	5⅜
Cobalt Contact	⅜
Colonial Silver	3⅝
Cum. Ely Mining	12⅛
Davis Daly	19
Dominion Cop.	6⅞
El Rayo	6⅜
Foster Cobalt	2⅝
Furnace Creek	2⅛
Giroux Mine	9⅜
Gold Hill	4½
Greene Gold	2
Greene G. & S.	2
Greenw'r & D. Val.	1⅜
Guanajuato	4⅛
Guggen. Exp.	290
Hanapah	⅜
McKinley Dar.	2⅜
Micmac	6½
Mines Co. of Am.	2⅛
Mitchell Mining	5⅝
Mont Sho. C. (New)	12
Nev. Utah M. & S.	4⅛
Newhouse M. & S.	18¼
Nipissing Mines	11⅞
Old Hundred	3⅝
Silver Queen	2¼
Stewart	2⅛
Tennessee Copper	47
Union Copper	¾
Utah Apex	7⅛
West Columbus	17½

N. Y. INDUSTRIAL	
Am. Agri. Chem.	
Am. Smelt. & Ref.	143
Am. Sm. & Ref., pf.	115¼
Bethlehem Steel	
Colo. Fuel & Iron	47⅞
Federal M. & S., pf.	94
Inter. Salt	18
National Lead	69¾
National Lead, pf.	102⅛
Pittsburg Coal	
Republic I. & S.	35
Republic I. & S., pf	97¼
Sloss-Sheffield	69½
Standard Oil	515
Tenn. C. & I.	
U. S. Red. & Ref.	
U. S. Steel	45
U. S. Steel, pf.	106¼
Va. Car. Chem.	33½
Va. I. Coal & Coke	86

ST. LOUIS Feb. 2		
N. of Com.	High.	Low.
Adams	.40	.35
Am. Nettie	.08	.06
Center Cr'k	2.40	2.25
Cent. C. & C.	65.50	63.50
C.C. & C pd.	80.00	79.00
Cent. Oil	60.00	50.00
Columbia	5.00	4.50
Con. Coal	24.00	22.00
Doe Run	150.00	140.00
Gra. Bimet.	.40	.22
St. Joe	20.00	18.00

BOSTON Feb. 5	
Name of Comp.	Clg.
Adventure	5½
Allouez	
Am. Zinc†	47
Arcadian	13⅞
Atlantic	17
Bingham	30¼
Boston Con.	30⅜
Calumet & Ariz.	183
Calumet & Hecla	945
Centennial	43¼
Con. Mercur	.51
Copper Range	94¾
Daly-West	19½
Franklin	28½
Granby*, New	133
Greene Con.	31⅜
Isle Royal	31⅝
Mass.	8½
Michigan	21½
Mohawk*	92½
Mont. C. & C. (new)	2
Nevada	17
North Butte	111⅛
Old Colony	2¾
Old Dominion	54
Osceola*	167
Parrot	31½
Phoenix	2½
Quincy†	144⅞
Rhode Island	11
Santa Fe	5¾
Shannon	22⅞
Tamarack*	150
Tecumseh	
Trinity	38
United Cop., com.	72⅝
U. S. Oil	11¾
U. S. Smg. & Ref.	63
U. S. Sm. & Re. pd.*	46¼
Utah Copper*	72⅛
Victoria	7⅞
Washington	
Winona	12¼
Wolverine	187
Wyandotte	2⅜

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	110
Ariz. Com.	36
Black Mt.	8⅛
Cananea Cent.	35
East Butte	15⅝
Hancock Con.	15
Keweenaw	13
Majestic	4
Raven	1⅞
Shawmut	⅛
Superior	20⅞
Superior & Pitts.	27½
Troy Man.	3⅛

LONDON Feb. 6			
Name of Com.	Clg.		
Dolores	£1	12s	6d
Stratton's Ind.	0	3	0
Camp Bird	1	7	9
Esperanza	2	10	0
Tomboy	2	5	0
El Oro	1	4	4½
Oroville	1	0	3
Somera	0	5	7½
Utah Apex	1	12	6
Ariz. Cop., pfd.	3	15	0
Ariz. Cop., def.	3	12	6

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO Jan. 30	
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.40
Best & Belcher	1.35
Caledonia	.56
Challar	.16
Con. Cal. & Va.	.94
Crown Point	.14
Exchequer	.55
Gould & Curry	.33
Hale & Norcross	.85
Mexican	.95
Ophir	2.75
Overman	.20
Potosi	.19
Savage	.90
Sierra Nevada	.50
Union	.45
Utah	.05
Yellow Jacket	.90
TONOPAH STOCKS	
Golden Anchor	.41
McNamara	.63
Montana-Pitts. ex.	.24
North Star	.41
Rescue	.20
GOLDFI'D STOCKS	
Black Ants	.15
Blue Bull	.55
Columbia Mt.	1.15
Comb. Frac.	5.50
Conquerer	.30
Daisy	2.95
Florence	
Frances-Mohawk	.80
Goldfield Con.	9.00
Grandma	.31
Great Bend	1.25
Red Hills	.35
St. Ives	1.15
BULLFROG STOCKS	
Amethyst	.55
Bonnie Claire	.35
Mayflower Con.	.57
Montgomery Mt.	.41
Original	.26
MANHAT'N STOCKS	
Gold Wedge	.18
Manhattan Mg.	.18
Pine Nut	.26
Ruby Wonder	.32
Yellow Horse	.09

NEVADA Feb. 6 (Weir Bros. & Co., New York)	
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	17.50
Tonopah Exten.	4.87½
Montana Tonop'h	3.90
Belmont	5.87½
Tonopah Midway	2.07
West End Con.	1.75
Jim Butler	1.17
GOLDFI'D STOCKS	
Sandstorm	.74
Kendall	.57
Red Top	3.95
Jumbo	3.95
Goldfield Mining	1.35
Dia'dfield B. B. C.	.50
Atlanta	.85
Mohawk	17.00
Silver Pick	1.40
Laguna	1.38
BULLFROG STOCKS	
Mont. Shoshone C.	12.00
Tramps Con.	1.70
Gold Bar	1.31
Bullfrog Mining	.38
Bullfrog Nat. B.	.55
Homestake Con.	1.35
MANHAT'N STOCKS	
Manhattan Con.	.90
Manhat'n Dexter	.60
Jumping Jack	
Stray Dog	
Indian Camp	

COLO. SPRINGS Feb. 2	
Name of Comp.	Clg.
Acacia	12
Black Bell	3
C. C. Con.	
Dante	5½
Doctor Jack Pot.	8
Elkton	61⅞
El Paso	55½
Findley	66
Gold Dollar	7½
Gold Sovereign	7⅜
Isabella	21⅜
Index	7
Jennie Sample	7¾
Jerry Johnson	6
Mary McKinney	63
Pharmacist	6⅜
Portland	1.22
Un. Gold Mines	9¼
Vindicator	96
Work	14¼

New Dividends

Company.	Payable.	Rate.	Amt.
Alaska Mexican	Jan. 28	$1.00	$200,000
Alaska Treadwell	Jan. 28	0.50	90,000
Alaska United	Jan. 28	0.30	90,000
Amalgamated Copper	Feb. 25	2.00	3,100,000
Consolidation Coal	Feb. 1	3.50	358,750
Dolores	Feb. 25	0.15	49,500
Dominion Coal, pfd.	Feb. 1	3.50	105,000
Fairmont Coal	Feb. 1	3.00	360,000
General Chemical	Mar. 4	2.00	148,206
International Nickel, pfd.	Feb. 1	1.50	133 659
Kendall, Mont.	Jan. 23	0.03	75,000
Mary McKinney, Colo.	Jan. 24	0.03	39,128
Mexican Co. M. & S.	Feb. 25	0.50	120,000
Philadelphia Co., pfd.	Mar. 1	1.25	143,620
Pocahontas Collieries, pfd.	Feb. 1	1.50	22,500
Snowstorm, Idaho	Feb. 1	0.03	45,000
Tennessee C., I. & R. R.	Feb. 1	1.00	225,536
Tennessee C., I. & R. R., pfd.	Feb. 1	2.00	4,960
Union Copper, Land & Ny.	Jan. 31	2.00	
U. S. Steel Corporation	Mar. 30	0.50	2,541,513
U. S. Steel Corp., pfd.	Feb. 28	1.75	6,304,919
U. S. Cast Iron Pipe	Mar. 1	1.00	150,000
U. S. Cast Iron Pipe, pfd.	Mar. 1	1.75	262,500
U. S. Smelt., Ref. & Mg.	Apr. 1	0.87½	1,312,500

Assessments

Company.	Delinq.	Sale.	Amt.
Belmont, Idaho	Feb. 7	Mar. 7	$0.002
Black Diamond, U.	Feb. 13	Mar. 6	0.01
Bullion, Nev.	Feb. 11	Mar. 8	0.05
Crown Point, Nev.	Feb. 5	Feb. 26	0.10
Deer Lodge, Utah	Feb. 18	Mar. 11	0.00½
Forty-nine Placer, U.	Feb. 8	Feb. 27	0.01
Golden Gate, Cal.	Jan. 7	Feb. 6	0.01
Mexican, Nev.	Jan. 10	Jan. 31	0.15
Naildriver, Utah	Dec. 24	Jan. 10	0.05
Nevada Superior	Jan. 21	Feb. 9	0.10
New Stockton, Utah	Feb. 18	Mar. 11	0.02½
Scottish Chief	Feb. 6	Feb. 25	0.02
Star Con., Utah	Dec. 20	Jan. 9	0.03
Tetro, Utah	Feb. 6	Mar. 11	0.03
Union Con., Nev.	Feb. 11	Mar. 4	0.10
Wabash, Utah	Jan. 12	Feb. 2	0.05

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108		30.464	
March	64.597		29.854	
April	64.765		29.984	
May	66.976		30.968	
June	65.394		30.185	
July	65.105		30.113	
August	65.949		30.529	
September	67.927		31.483	
October	69.523		32.148	
November	70.813		32.671	
December	69.050		32.003	
Year	66.791		30.868	

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

	New York.				London.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869		18.116		78.147	
March	18.361		18.641		81.111	
April	18.375		18.688		84.793	
May	18.475		18.724		84.867	
June	18.442		18.719		83.994	
July	18.190		18.585		81.167	
August	18.380		18.706		83.864	
Septemb'r.	19.033		19.328		87.831	
October	21.203		21.722		97.269	
November	21.833		22.398		100.270	
December	22.885		23.350		105.226	
Year	19.278		19.616		87.282	

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	
February	36.403		August	40.606	
March	36.662		September	40.516	
April	38.900		October	42.852	
May	43.313		November	42.906	
June	39.260		December	42.750	
			Av. year	39.819	

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464		16.031	
March	5.350		15.922	
April	5.404		15.959	
May	5.685		16.725	
June	5.750		16.813	
July	5.750		16.525	
August	5.750		17.109	
September	5.750		18.266	
October	5.750		19.350	
November	5.750		19.281	
December	5.900		19.609	
Year	5.657		17.370	

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

Month.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075		5.924		25.844	
March	6.209		6.056		24.563	
April	6.078		5.931		25.781	
May	5.997		5.846		27.000	
June	6.096		5.948		27.728	
July	6.006		5.856		26.800	
August	6.027		5.878		26.938	
September	6.216		6.056		27.563	
October	6.222		6.070		28.075	
November	6.375		6.225		27.781	
December	6.593		6.443		27.938	
Year	6.198		6.048		27.020	

New York and St. Louis, cents per pound. London in pounds sterling per long ton.